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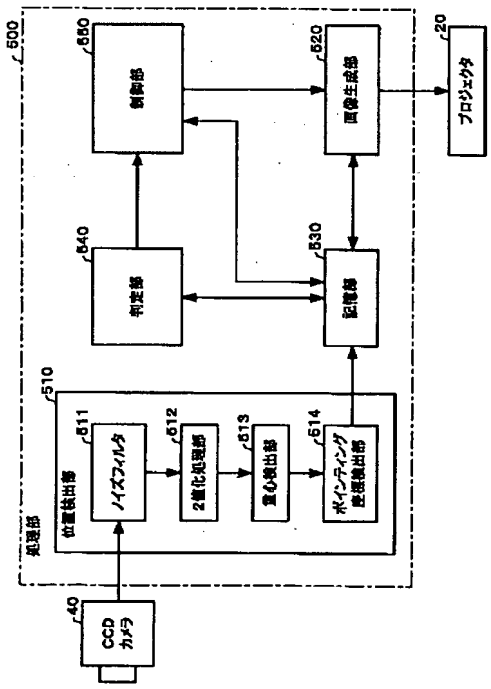
(54)【発明の名称】　画像生成システム、プレゼンテーションシステムおよび情報記憶媒体

(57)【要約】
【課題】　特別な指示具を用いることなく、指示操作を視覚的に分かりやすく示すことのできる画像生成システム、プレゼンテーションシステムおよび情報記憶媒体を提供すること。
【解決手段】　ＣＣＤカメラ４０からの撮像情報に基づき、レーザーポインタによるスポット光の重心位置を検出する重心検出部５１３と、当該重心位置に基づきポインティング座標を検出するポインティング座標検出部５１４と、スポット光の消灯時の座標位置を記憶する記憶部５３０と、スポット光の消灯時の座標位置とスポット光の再点灯時の座標位置とが所定の許可範囲内にあるか判定する判定部５４０とを設ける。判定部５４０により、上記所定の許可範囲内にあると判定された場合には、クリック操作等の一連の操作であると判別し、画像生成部５２０を用いてクリック操作等に対応した画像を生成する。



【特許請求の範囲】
【請求項１】　光ポインタによる指示用の光の投射される所定の画像表示領域に表示される画像を生成する画像生成システムにおいて、
前記画像表示領域を撮像する撮像手段と、
当該撮像手段による撮像情報に基づき、前記光ポインタによる指示位置を検出する指示位置検出手段と、
前記撮像情報に基づき前記光の点滅を検出して指示内容を判別する判別手段と、
前記画像表示領域に表示される画像であって、前記指示位置検出手段の位置検出情報に基づく指示位置および前記判別手段により判別された指示内容に対応した画像が表示されるように画像生成手段を制御する制御手段と、
を含むことを特徴とする画像生成システム。
【請求項２】　請求項１において、
前記判別手段は、前記光の点滅に基づき、クリック操作を判別し、
前記制御手段は、前記画像表示領域内の所定のアイコン画像の表示領域で前記クリック操作が行われた場合、前記アイコン画像の色および形状の少なくとも一方を変化させたアイコン画像が表示されるように前記画像生成手段を制御することを特徴とする画像生成システム。
【請求項３】　請求項１、２のいずれかにおいて、
前記判別手段は、前記光の消灯時の指示位置と前記光の再点灯時の指示位置との差が所定の範囲内であれば、一連の指示操作として判別することを特徴とする画像生成システム。
【請求項４】　請求項３において、
前記判別手段は、前記差の範囲を、前記光ポインタの点滅スイッチの操作方向については、当該点滅スイッチの操作方向とは異なる方向に比べて相対的に大きくしていることを特徴とする画像生成システム。
【請求項５】　請求項１～４のいずれかにおいて、
前記制御手段は、前記指示位置検出手段の位置検出情報に基づく指示位置付近に指示用カーソルが表示されるように前記画像生成手段を制御することを特徴とする画像生成システム。
【請求項６】　請求項５において、
前記制御手段は、前記画像表示領域外に前記画像表示領域内の指示位置を指示する前記指示用カーソルが表示される指示位置を前記光ポインタによって指示された場合、前記指示用カーソルが前記画像表示領域内に表示されるように、前記指示用カーソルの表示位置および表示方向を調整した画像が表示されるように前記画像生成手段を制御することを特徴とする画像生成システム。
【請求項７】　請求項１～６のいずれかに記載の画像生成システムと、
前記画像表示領域へ向け前記画像生成手段で生成されるプレゼンテーション用画像を投写する投写手段と、
を含むことを特徴とするプレゼンテーションシステム。
【請求項８】　光ポインタによる指示用の光の投射される所定の画像表示領域に表示される画像を生成するための情報を記憶したコンピュータ読み取り可能な情報記憶媒体であって、
前記情報は、
前記画像表示領域の撮像情報に基づき、前記光ポインタによる指示位置を検出する指示位置検出手段と、
前記撮像情報に基づき前記光の点滅を検出して指示内容を判別する判別手段と、
前記画像表示領域に表示される画像であって、前記指示位置検出手段の位置検出情報に基づく指示位置および前記判別手段により判別された指示内容に対応した画像が表示されるように画像生成手段を制御する制御手段と、
を実現するための情報を含むことを特徴とする情報記憶媒体。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】本発明は、指示用の光を用いた指示が行われる画像を生成する画像生成システム、プレゼンテーションシステムおよび情報記憶媒体に関する。
【０００２】
【背景技術および発明が解決しようとする課題】液晶プロジェクタ等を用いたプレゼンテーションシステムで用いられる一般的なレーザーポインタ等の光ポインタには、単にスクリーン上の画像を指示する機能しかなく、通常のＰＣ操作やマウスのクリック機能はなかった。
【０００３】そのため、指示者は、レーザーポインタで所望の位置を指示した後、ＰＣ（Personal Computer）のキーボード操作あるいはマウス操作のためにレーザーポインタでの指示を一旦止め、キーボードやマウスのある場所に移動する必要があった。このため、指示の流れが止まってしまい、聴衆は指示者の話を集中して聞くことができず、さらには、指示者もスムーズな指示ができなかった。
【０００４】また、この問題を解決するため、光ポインタに複数のボタンを設け、各ボタンに下線を引く等の機能を割り付けた光ポインタが提案されている。
【０００５】例えば、レーザーポインタのボタンの１つに下線を引く機能を割り付け、プレゼンターが当該ボタンを押すことにより、プレゼンテーション画像の一部として表示されている文字に下線を引く操作が行われていた。
【０００６】しかし、レーザーポインタに複数のボタンを設けた場合、レーザーポインタ自体が大きくなる上、重くなり、指示操作時の操作性や携帯性が真に快適とは言えない状態であった。
【０００７】また、例えば、プレゼンテーション画像上のアイコンを、マウス操作等でクリック指示した場合でも、従来はアイコン画像の表示の変化が乏しかった。こ

のため、聴衆だけでなく、指示者にとっても、クリックなのかドラッグなのか分かりづらかった。

【０００８】本発明は、上記の課題に鑑みなされたものであり、その目的は、特別な光ポインタを用いることなく、光ポインタによる指示操作が視覚的に分かりやすい画像生成システム、プレゼンテーションシステムおよび情報記憶媒体を提供することにある。

【０００９】

【課題を解決するための手段】上記課題を解決するため、本発明に係る画像生成システムは、光ポインタによる指示用の光の投射される所定の画像表示領域に表示される画像を生成する画像生成システムにおいて、前記画像表示領域を撮像する撮像手段と、当該撮像手段による撮像情報に基づき、前記光ポインタによる指示位置を検出する指示位置検出手段と、前記撮像情報に基づき前記光の点滅を検出して指示内容を判別する判別手段と、前記画像表示領域に表示される画像であって、前記指示位置検出手段の位置検出情報に基づく指示位置および前記判別手段により判別された指示内容に対応した画像が表示されるように画像生成手段を制御する制御手段と、を含むことを特徴とする。

【００１０】また、本発明に係る情報記憶媒体は、光ポインタによる指示用の光の投射される所定の画像表示領域に表示される画像を生成するための情報を記憶したコンピュータ読み取り可能な情報記憶媒体であって、前記情報は、前記画像表示領域の撮像情報に基づき、前記光ポインタによる指示位置を検出する指示位置検出手段と、前記撮像情報に基づき前記光の点滅を検出して指示内容を判別する判別手段と、前記画像表示領域に表示される画像であって、前記指示位置検出手段の位置検出情報に基づく指示位置および前記判別手段により判別された指示内容に対応した画像が表示されるように画像生成手段を制御する制御手段と、を実現するための情報（例えば、プログラム等）を含むことを特徴とする。

【００１１】また、本発明に係るプログラムは、上記各手段を実現するためのモジュールを含むことを特徴とする。

【００１２】本発明によれば、特別な光ポインタを用いることなく、光ポインタからの光の点滅を検出して指示内容を判別し、判別された指示内容に対応した画像を生成することができる。

【００１３】これにより、キーボードやマウス等を用いることなく、光ポインタだけを用いて指示内容を反映した画像を表示することができる。

【００１４】指示者は、光ポインタとキーボードやマウス等とを持ち替えることなく、指示内容に対応した画像の演出が行える。したがって、指示者は、効率よく自分の操作内容を聴衆に伝えることができ、聴衆も指示内容を理解しやすい。

【００１５】ここで、前記指示内容に対応した画像としては、例えば、アイコンを選択状態にした画像、アイコンを移動させる画像、アイコンに関連付けられたアプリケーションプログラムの実行時の画像等が該当する。すなわち、前記指示内容に対応した画像は、静止画像であっても、動画像であってもよい。

【００１６】また、前記画像生成システム、前記情報記憶媒体および前記プログラムにおいて、前記判別手段は、前記光の点滅に基づき、クリック操作を判別し、前記制御手段は、前記画像表示領域内の所定のアイコン画像の表示領域で前記クリック操作が行われた場合、前記アイコン画像の色および形状の少なくとも一方を変化させたアイコン画像が表示されるように前記画像生成手段を制御することが好ましい。

【００１７】これによれば、指示者は、クリック操作が判別されたことが視覚的に分かる。

【００１８】また、これにより、当該画像を見ている者にとって光ポインタの操作者がクリック操作を行っていることを容易に識別できる。

【００１９】また、前記画像生成システム、前記情報記憶媒体および前記プログラムにおいて、前記判別手段は、前記光の点滅および移動に基づき、ドラッグ操作を判別し、前記画像生成システム、前記情報記憶媒体および前記プログラムにおいて、前記制御手段は、前記画像表示領域内の所定のアイコン画像の表示領域で前記ドラッグ操作が行われた場合、前記アイコン画像の色および形状の少なくとも一方を変化させたアイコン画像を生成し、前記光の移動に基づき当該アイコン画像を移動するように表示されるように画像生成手段を制御することが好ましい。

【００２０】これによれば、指示者は、ドラッグ操作が判別されたことが視覚的に分かる。

【００２１】また、当該画像を見ている者にとって光ポインタの操作者がドラッグ操作を行っていることを容易に識別できる。

【００２２】また、前記画像生成システム、前記情報記憶媒体および前記プログラムにおいて、前記判別手段は、前記光の消灯時の指示位置と前記光の再点灯時の指示位置との差が所定の範囲内であれば、一連の指示操作として判別することが好ましい。

【００２３】これによれば、光を点滅させて指示を行う場合に所定の許容範囲を設けることにより、多少の手ぶれがあった場合でも適切に指示操作として判別することができる。

【００２４】また、前記画像生成システム、前記情報記憶媒体および前記プログラムにおいて、前記判別手段は、前記差の範囲を、前記光ポインタの点滅スイッチの操作方向については、当該点滅スイッチの操作方向とは異なる方向に比べて相対的に大きくしていることが好ましい。

【００２５】これによれば、手ぶれの起きやすい方向を

広めにした許容範囲を設定することにより、誤検出を低減できる。したがって、より適切に指示操作を判別することができる。

【００２６】例えば、点滅スイッチを下方向に押すことにより光の点滅操作を行う場合、下方向に光がぶれやすい。したがって、下方向に許容範囲を広げることにより、当該光のぶれを考慮して適切な許容範囲を設定することができる。

【００２７】また、前記画像生成システム、前記情報記憶媒体および前記プログラムにおいて、前記制御手段は、前記指示位置検出手段の位置検出情報に基づく指示位置付近に指示用カーソルが表示されるように前記画像生成手段を制御することが好ましい。

【００２８】また、前記画像生成システム、前記情報記憶媒体および前記プログラムにおいて、前記制御手段は、前記画像表示領域外に前記画像表示領域内の指示位置を指示する前記指示用カーソルが表示される指示位置を前記光ポインタによって指示された場合、前記指示用カーソルが前記画像表示領域内に表示されるように、前記指示用カーソルの表示位置および表示方向を調整した画像が表示されるように前記画像生成手段を制御することが好ましい。

【００２９】これによれば、例えば、左向き矢印形状の指示用カーソルが、画像表示領域の左端から少しだけ画像表示領域外にはみ出してしまった場合でも、指示用カーソルを右向き矢印形状の表示に変更することにより、適切に指示位置を指示することができる。

【００３０】また、本発明に係るプレゼンテーションシステムは、上記の画像生成システムと、前記画像表示領域へ向け前記画像生成手段で生成されるプレゼンテーション用画像を投写する投写手段と、を含むことを特徴とする。

【００３１】本発明によれば、プレゼンテーションにおいて、特別な光ポインタを用いることなく、指示操作が視覚的に分かりやすいプレゼンテーションシステムを実現できる。

【００３２】

【発明の実施の形態】以下、本発明を、光ポインタを用いて指示を行うプレゼンテーションシステムに適用した場合を例に採り、図面を参照しつつ説明する。

【００３３】（システム全体の説明）図１は、本実施の形態の一例に係るプレゼンテーションシステムの概略説明図である。

【００３４】スクリーンのほぼ正面に設けられたプロジェクタ２０から、所定のプレゼンテーション用の画像が投写される。プレゼンター３０は、スクリーン１０上の画像が表示されている領域すなわち画像表示領域１２の画像の所望の位置をレーザーポインタ１００で指し示しながら、第三者に対するプレゼンテーションを行なう。

【００３５】プレゼンター３０がレーザーポインタ１００から投射されるスポット光２００を用いてスクリーン上の画像表示領域１２の所望の位置を指示すると、画像表示領域１２、プレゼンター３０の一部およびスポット光２００が、画像表示領域１２のほぼ正面に設けられ、撮像手段として機能するＣＣＤカメラ４０により、指示画像として撮像される。

【００３６】指示画像は、重心検出処理等の画像処理が行われ、スポット光２００の重心位置が指示位置として検出される。

【００３７】このように、プレゼンテーション画像を投写し、プレゼンテーション画像上のアイコンをレーザーポインタ１００で指示する場合、通常の手法では、アイコン画像の変化が乏しいため、クリックなのかドラッグなのか聴衆にとっては分かりづらい。

【００３８】また、プレゼンテーション画像のうち所望の部分に下線を引く等の機能をレーザーポインタ１００を用いて実現する場合、レーザーポインタ１００に複数のボタンを設けると、レーザーポインタ１００自体が大きくなる上、重くなり、指示操作時の操作性や携帯性が真に快適とは言えない状態となってしまう。

【００３９】そこで、本実施の形態では、キーボード、マウスあるいは高機能レーザーポインタ等を用いることなく、通常のレーザーポインタ１００を用いて視覚的に分かりやすい指示操作を行えるようにしている。

【００４０】図２は、画像表示領域１２におけるスポット光２００とアイコン３００の状態を示す図であり、図２（Ａ）は、スポット光２００移動時の状態を示し、図２（Ｂ）は、スポット光２００がアイコン３００に重なった状態を示し、図２（Ｃ）は、スポット光２００が消滅した状態を示し、図２（Ｄ）は、スポット光２００が再点灯した状態を示す図である。

【００４１】ここでは、プレゼンターがレーザーポインタ１００の点滅操作により、アイコン３００のクリック指示を行うことを想定する。

【００４２】図２（Ａ）に示すように、プレゼンターがレーザーポインタ１００の先端を左方向に移動させることにより、スポット光２００もアイコン３００に向かって左方向に移動する。

【００４３】図２（Ｂ）に示すように、プレゼンター３０は、スポット光２００がアイコン３００に重なる地点までレーザーポインタ１００の先端を左方向に移動させる。

【００４４】そして、スポット光２００がアイコン３００に重なる時点で、図２（Ｃ）に示すように、プレゼンター３０は、レーザーポインタ１００の点滅スイッチをＯＦＦにしてスポット光２００を消滅させる。

【００４５】スイッチをＯＦＦにした直後、図２（Ｄ）に示すように、プレゼンター３０は、レーザーポインタ１００の点滅スイッチをＯＮにしてスポット光２００を再点灯させる。

【００４６】以上の点滅動作を識別することにより、プレゼンターが点滅操作によってクリック操作を行ったことを処理装置が認識できる。

【００４７】処理装置は、クリック操作を認識することにより、図２（Ｄ）に示すように、アイコン３００の色を変化させる。

【００４８】これにより、プレゼンターがクリック操作を行っていることを聴衆は容易に判別することができる。

【００４９】次に、スポット光２００とクリック操作等の各機能との関係についてより詳細に説明する。

【００５０】図３は、スポット光２００の発光状態と機能との関係を示す模式図である。

【００５１】発光状態は、上の線がスイッチＯＮの状態で下の線がスイッチＯＦＦの状態を示す。

【００５２】例えば、初期状態では、スイッチはＯＦＦであり、非指示という状態である。スイッチがＯＮになると図２（Ａ）に示すような指示機能が働く。

【００５３】そして、所定時間内でスイッチがＯＮの状態からＯＦＦ（消滅）となり、さらにＯＮ（再点灯）となった場合にシングルクリックとしての機能が働く。

【００５４】その後、スイッチＯＮの状態では再び指示機能が働く。

【００５５】そして、所定時間内でスイッチがＯＮの状態からＯＦＦ（消滅）、ＯＮ（再点灯）となり、さらに、ＯＦＦ（再消滅）、ＯＮ（再点灯）となった場合にダブルクリックとしての機能が働く。

【００５６】その後、スイッチＯＮの状態では再び指示機能が働き、スイッチＯＦＦの状態では非指示となる。

【００５７】このように、スポット光２００の点滅操作だけでも、その点滅回数や点滅間隔を検出することにより、種々の機能を実現することができる。

【００５８】また、本実施の形態では、スポット光２００の点滅操作の際、図２（Ｄ）に示すように、スポット光２００の消滅時と再点灯時の位置のずれに対して許容範囲３２０を設けている。すなわち、再点灯時のスポット光２００による指示位置と、消滅時の指示位置との差が許容範囲３２０内に収まるものであれば、多少指示位置が異なっていても一連の指示操作として認識する。

【００５９】特に、許容範囲３２０については、図２（Ｄ）に示すように、左右方向に対して上下方向を広めに設定してある。これは、レーザーポインタ１００のスイッチは、上下方向に押されるように設けられており、スイッチの操作時には、上下方向の手ぶれ量が左右方向の手ぶれ量に比べて大きいと考えられるからである。さらに、上下方向のうち下側の許容範囲を上側よりも大きく設定してもよい。

【００６０】なお、レーザーポインタ１００のスイッチが、左右方向に押されるように設けられている場合には、許容範囲３２０を、上下方向に対して左右方向を広めに設定することが好ましい。

【００６１】このように、許容範囲３２０を設けることにより、多少の手ぶれがあった場合でも適切に指示操作として判別することができる。

【００６２】また、手ぶれの起きやすい方向を広めにした許容範囲３２０を設定することにより、より適切に指示操作を判別することができる。

【００６３】なお、本実施の形態では、このような手ぶれ量、すなわち、スポット光２００のずれ量と、レーザー光の投射距離との関係についても考慮している。

【００６４】図４は、レーザー光の投射距離とスポット光２００のずれ量との関係を示す模式図である。

【００６５】レーザーポインタ１００から画像表示領域１２までの距離がＤ１、Ｄ２、Ｄ３と長くなるに従って、手ぶれ角度はθとして一定であっても、スポット光２００のずれ量は、Ｌ１、Ｌ２、Ｌ３と大きくなる。

【００６６】したがって、レーザーポインタ１００から画像表示領域１２までの距離が長くなる場合には、許容範囲３２０も大きめに設定することが好ましい。

【００６７】（機能ブロックについての説明）次に、これらの機能を実現するための本システムの機能ブロックについて説明する。

【００６８】図５は、本実施の形態の一例に係るシステムの機能ブロック図である。

【００６９】本システムは、撮像手段であるＣＣＤカメラ４０と、処理部５００と、投写手段であるプロジェクタ２０（前面投写型の液晶プロジェクタ）とを含んで構成されている。

【００７０】また、処理部５００は、ＣＣＤカメラ４０の撮像信号に基づき指示位置の検出を行う位置検出部５１０と、指示位置の検出結果に基づき、カーソル２００の画像、アイコン３００の画像および画像表示領域１２に表示するための画像情報等を生成してプロジェクタ２０に出力する画像生成部５２０とを含んで構成されている。

【００７１】より具体的には、位置検出部５１０は、撮像画像のノイズを除去するノイズフィルタ５１１と、撮像情報に対してデータ処理を行いやすいように２値化を行う２値化処理部５１２と、２値化された撮像情報に基づきスポット光２００の重心を検出する重心検出部５１３と、検出された重心位置に基づき指示位置（ポインティング位置）を検出するポインティング座標検出部５１４とを含んで構成されている。

【００７２】また、処理部５００は、上述したスポット光２００の消滅時の指示位置や許容範囲３２０、さらには、アプリケーションプログラム等を記憶する記憶部５３０と、再点灯時の指示位置が許容範囲３２０内にあるか判定する判定部５４０と、この判定結果に基づき画像生成部５２０を制御する制御部５５０とを含んで構成されている。

【００７３】なお、処理部５００のハードウェア構成については後述する。

【００７４】次に、上述した各部を用いた指示動作の検出の流れについてフローチャートを用いて説明する。

【００７５】（指示動作の検出の流れについての説明）図６は、本実施の形態の一例に係る指示動作の検出の流れを示すフローチャートである。

【００７６】ここでは、主にクリック操作について説明する。

【００７７】プレゼンター３０は、レーザーポインタ１００を点灯して画像表示領域１２を指示する（ステップＳ４）。

【００７８】位置検出部５１０は、ＣＣＤカメラ４０からの撮像情報によりスポット光２００を検出し、ポインティング座標検出部５１４で指示座標を検出する。

【００７９】プレゼンター３０は、図２（Ａ）～図２（Ｃ）に示すように、クリック操作を行うため、スポット光２００がアイコン３００に重なった時点でレーザーポインタ１００を消灯する（ステップＳ６）。

【００８０】この時点で、ポインティング座標検出部５１４は、消灯直前の指示座標Ａと消灯時刻Ａを記憶部５３０に記憶する（ステップＳ８）。

【００８１】そして、判定部５４０は、画像生成部５２０で生成され、記憶部５３０に記憶された画像情報に基づき、座標Ａに一致する座標を有するアイコン３００が現在の画面に表示されているかどうかを判定する（ステップＳ１０）。

【００８２】そして、プレゼンター３０は、図２（Ｄ）に示すように、クリック操作を行うため、レーザーポインタ１００を再点灯する（ステップＳ１２）。

【００８３】ポインティング座標検出部５１４は、再点灯時の指示座標Ｂと時刻Ｂを検出し、記憶部５３０に記憶する（ステップＳ１４）。

【００８４】判定部５４０は、記憶部５３０に記憶された消灯時の座標位置Ａと、再点灯時の座標位置Ｂとを比較して許容範囲３２０内にあるかどうかを判定する。さらに、判定部５４０は、記憶部５３０に記憶された消灯時の時刻Ａと、再点灯時の時刻Ｂとを比較して第１の所定時間内に再点灯が行われたか判定する（ステップＳ１６）。

【００８５】許容範囲３２０内であって、かつ、所定の時間内に再点灯が行われた場合、判定部５１８は、１回目のクリック操作であると認識する（ステップＳ１８）。

【００８６】判定部５１８は、１回目のクリック操作であると認識した場合、ステップＳ１０で把握した座標位置Ａと一致するアイコン３００の画像を変更するように制御部５５０に命令を出す。

【００８７】制御部５５０は、当該命令に基づき、アイコン３００の画像を変更するように画像生成部５２０を制御する。

【００８８】画像生成部５２０は、当該制御により、図２（Ｄ）に示すようなアイコン３００が選択された画像が表示されるように画像情報を生成し、プロジェクタ２０に当該画像情報を出力する。

【００８９】プロジェクタ２０は、当該画像情報に基づき、画像を投写する。これにより、図２（Ｄ）に示すようなアイコン３００が選択された画像が表示され、シングルクリックが実行されたことになる（ステップＳ２０）。

【００９０】さらに、判定部５４０は、時刻Ｂ後の第２の所定時間内に消灯、点灯がないか判定する（ステップＳ２２）。

【００９１】また、判定部５４０は、時刻Ｂ後の第２の所定時間内に消灯、点灯があった場合は、それぞれ何回の消灯、点灯があったかを示すカウント値を記憶部５３０に記憶する（ステップＳ２４）。

【００９２】そして、カウント値が所定の値になった場合または第２の所定時間を経過した場合、判定部５４０は、カウント値に応じて処理（ダブルクリック、ドラッグ）が行われるように、制御部５５０に命令を出す。

【００９３】制御部５５０は、当該命令に基づき、指示内容に応じた処理が行われるように、画像生成部５２０を制御する。

【００９４】例えば、ダブルクリックの場合、画像生成部５２０は、記憶部３００を参照してアイコン３００に所定のアプリケーションプログラムが関連付けられているかどうか判断し、当該関連づけがされている場合、アプリケーションプログラム実行時の画像を表示するための画像情報を生成する（ステップＳ２６）。

【００９５】そして、上述した処理の流れと同様に、プロジェクタ２０は、アプリケーションプログラム実行時の画像をスクリーン１０に投写する。

【００９６】これにより、スクリーン１０上の表示画面が変更され、プレゼンター３０および聴衆は、アイコン３００をダブルクリックしてアプリケーションプログラムが実行されたことを視覚的に認識できる（ステップＳ２８）。

【００９７】以上のように、本実施の形態によれば、マウスやキーボード等を用いることなく、一般的なレーザーポインタ１００を用いてクリック操作等を行うことができる。また、クリック操作等の際にアイコン３００の画像を変化させることにより、プレゼンター３０および聴衆にとって視覚的に分かりやすく、効果的にプレゼンテーションを行うことができる。

【００９８】また、本実施の形態では、判定部５４０は、ポインティング座標検出部５１４によって検出されたスポット光２００の点滅回数に基づき、クリック画像（アイコンを選択状態にした画像）、ドラッグ画像（アイコンを移動させる画像）、ダブルクリック時の画像

（アイコンに関連付けられたアプリケーションプログラムの実行時の画像）等のうちどの画像を表示するための操作をプレゼンター３０が行ったのか判定する。

【００９９】例えば、スポット光２００の動きの変化を検出してプレゼンター３０の操作内容を把握することも可能であるが、処理が重くなる。スポット光２００の点滅回数で判定することにより、位置検出部５１０や判定部５１８等を簡易な構成で実現でき、かつ、迅速に判定が行える。

【０１００】（カーソルを用いた例）なお、アイコン３００の表示を変化させるだけでなく、検出された指示位置に追従して表示されるカーソルの表示を変化させることも可能である。ここでは、指示時に矢印形状のカーソルを表示し、クリック時に円形状のカーソルを表示し、ドラッグ時に楕円形状のカーソルを表示することを想定する。

【０１０１】図７は、画像表示領域におけるカーソルとアイコンの状態を示す図であり、図７（Ａ）は、カーソル移動時の状態を示し、図７（Ｂ）は、カーソルがアイコンに重なった状態を示し、図７（Ｃ）は、クリック認識時のカーソルの表示状態を示し、図７（Ｄ）は、ドラッグ認識時のカーソルの表示状態を示す図である。

【０１０２】図７（Ａ）に示すように、プレゼンター３０は、光ポインタの先端を左方向に移動させて左向き矢印形状のカーソル２０２をアイコン３００に近づける。

【０１０３】そして、図７（Ｂ）に示すように、プレゼンター３０は、カーソル２０２の矢印の先端をアイコン３００に重ならせた時点で一旦消灯し、すぐに再点灯する。これにより、判定部５１８はクリック操作であると認識し、画像生成部５２０にクリック操作に適合したカーソルの形状になるように命令を出す。

【０１０４】このような命令が出されることにより、図７（Ｃ）に示すように、画像生成部５２０は、円形状のカーソル２０４の画像を生成し、プロジェクタ２０は、円形状のカーソル２０４の画像を投写表示する。

【０１０５】また、ドラッグ操作時には、プレゼンター３０は、例えば、５秒程度光ポインタのスイッチをＯＮにし、ＯＦＦにした後すぐにＯＮにして光ポインタの先端を動かすことによりドラッグ操作を行う。

【０１０６】このような操作が行われたことを認識した判定部５１８は、画像生成部５２０にドラッグ操作に適合したカーソルの形状になるように命令を出す。

【０１０７】このような命令が出されることにより、図７（Ｄ）に示すように、画像生成部５２０は、楕円形状のカーソル２０６の画像を生成し、プロジェクタ２０は、楕円形状のカーソル２０６の画像を投写表示する。なお、ドラッグ操作時には、プロジェクタ２０は、光ポインタからの光の移動に合わせてアイコン３００およびカーソル２０６を移動するように投写表示する。

【０１０８】このように、アイコン３００だけでなく、カーソル２０２～２０６の表示を変更することによっても、プレゼンター３０は、聴衆にとって視覚的に分かりやすい指示操作を行うことができる。

【０１０９】さらに、本実施の形態では、画像表示領域１２の端点においても指示用のカーソル２０２が見えやすいようにカーソル２０２を表示している。

【０１１０】図８は、画像表示領域１２におけるカーソル２０２とアイコン３００の状態を示す他の図であり、図８（Ａ）は、画像表示領域の中央付近にアイコン３００をカーソル２０２で指示している状態を示し、図８（Ｂ）は、右端付近にあるアイコン３００を従来のカーソル２０２で指示している状態を示し、図８（Ｂ）は、右端付近にあるアイコン３００を本実施形態のカーソル２０２で指示している状態を示す図である。

【０１１１】例えば、通常の状態では、図８（Ａ）に示すように、画像表示領域の中央付近にアイコン３００がある場合、左向き矢印形状のカーソル２０２で指示することは可能である。

【０１１２】しかし、図８（Ｂ）に示すように、右端付近にあるアイコン３００を左向き矢印形状のカーソル２０２で指示しようとしても、カーソル２０２の位置はアイコン３００に対して右側であるため、画像表示領域１２からカーソル２０２がはみ出してしまう。このため、実際には、指示可能であるにも関わらず、カーソル２０２が表示されなくなってしまう。

【０１１３】本実施の形態では、図８（Ｃ）に示すように、右端付近にあるアイコン３００を左向き矢印形状のカーソル２０２で指示する場合、カーソル２０２の向きを逆にし、カーソル２０２をアイコン３００の左側に表示することにより、このような問題を解決している。

【０１１４】例えば、判定部５１８が、ポインティング座標検出部５１４の検出結果に基づき、カーソル２０２の表示位置が画像表示領域１２からはみ出してしまうことを判別すると、そのはみ出しの範囲が所定の許容範囲内であれば、カーソル２０２の向きや位置を調整することにより、画像表示領域１２内にカーソル２０２が表示されるように、画像生成部５２０を制御する。

【０１１５】このように、本実施の形態によれば、画像表示領域１２外にカーソル２０２がはみ出す場合でも適切にカーソル２０２を表示することができる。

【０１１６】（ハードウェア構成についての説明）次に、処理部５００のハードウェア構成について説明する。

【０１１７】図９は、本実施の形態の一例に係る処理部５００のハードウェア構成の説明図である。

【０１１８】同図に示す装置では、位置検出部５１０、判定部５４０および制御部５５０の機能を実現するＣＰＵ１０００、ＲＯＭ１００２、記憶部５３０の機能を実現するＲＡＭ１００４、情報記憶媒体１００６、画像生成部５２０の機能を実現する画像生成ＩＣ１０１０、Ｉ

／Ｏ（入出力ポート）１０２０－１、１０２０－２が、システムバス１０１６により相互にデータ送受信可能に接続されている。そして、Ｉ／Ｏ１０２０－１、１０２０－２を介してＣＣＤカメラ４０、プロジェクタ２０等の機器に接続されている。

【０１１９】情報記憶媒体１００６は、プログラムやモジュール等が格納されるものである。なお、情報記憶媒体１００６としては、例えば、レーザー光により情報を読み取らせるＣＤ－ＲＯＭやＤＶＤ－ＲＯＭ等、磁気により情報を読み取らせるハードディスクや、メモリ等を適用できる。また、情報記憶媒体からの情報の読み取り方式は接触方式でも非接触方式でもよい。

【０１２０】また、図１～図８で説明した各種の処理は、これらの処理を行うためのプログラムを格納した情報記憶媒体１００６と、当該プログラムに従って操作するＣＰＵ１０００、画像生成ＩＣ１０１０等によって実現される。なお画像生成ＩＣ１０１０等で行われる処理は、ＣＰＵ１０００や汎用のＤＳＰ等によりソフトウェア的に行ってもよい。

【０１２１】また、情報記憶媒体１００６に代えて、上述した各機能を実現するためのプログラム等を伝送路を介してホスト装置等からダウンロードすることによって上述した各機能を実現することも可能である。すなわち、上述した各機能を実現するための情報は、搬送波に具現化される（embodied）ものであってもよい。

【０１２２】以上、本発明を適用した好適な実施の形態について説明してきたが、本発明の適用は上述した実施例に限定されない。

【０１２３】（その他の実施例）例えば、アイコン３００や、カーソル２０２等の表示の変更としては、形状だけの変更、色だけの変更、形状と色の両方の変更であってもよい。具体的には、例えば、点滅表示や、反転表示等を行ってもよい。これらによっても光ポインタの操作者による指示操作を視覚的に分かりやすく示すことができる。なお、光ポインタは、上述したレーザーポインタに限られず、赤外ポインタ等の各種の光を投射するポインタを適用できる。

【０１２４】また、本実施の形態では、指示内容を判定して画像を生成する例について説明したが、例えば、指示内容を判定して音を鳴らす、指示内容を判定してある部分を振動させるといった処理を行うことも可能である。

【０１２５】また、上述したプロジェクタのような投写手段以外にも表示手段で画像表示を行ってプレゼンテーション等を行う場合にも本発明を適用できる。このような表示手段としては、例えば、液晶プロジェクタのほか、ＣＲＴ（ＣａｔｈｏｄｅＲａｙ Ｔｕｂｅ）、ＰＤＰ（Ｐｌａｓｍａ Ｄｉｓｐｌａｙ Ｐａｎｅｌ）、ＦＥＤ（Ｆｉｅｌｄ Ｅｍｉｓｓｉｏｎ Ｄｉｓｐｌａｙ）、ＥＬ（Ｅｌｅｃｔｒｏ Ｌｕｍｉｎｅｓｃｅｎｃｅ）、直視型液晶表示装置等のディスプレイ装置等が該当する。

【０１２６】また、処理部５００の各部を、プロジェクタ２０に内蔵してもよく、ＰＣ等のプロジェクタ２０の外部装置に内蔵してもよく、プロジェクタ２０とＰＣ等とで分担して内蔵してもよい。

【０１２７】さらに、上述した実施例では、前面投写型のプロジェクタを適用した例について説明したが、背面投写型のプロジェクタを適用することも可能である。

【０１２８】また、本発明は、プレゼンテーションシステムに限定されず、指示位置を検出して検出結果に基づき画像を生成する各種の画像生成システムにも適用できる。

【図面の簡単な説明】

【図１】本実施の形態の一例に係るプレゼンテーションシステムの概略説明図である。

【図２】画像表示領域におけるスポット光とアイコンの状態を示す図であり、図２（Ａ）は、スポット光移動時の状態を示し、図２（Ｂ）は、スポット光がアイコンに重なった状態を示し、図２（Ｃ）は、スポット光が消滅した状態を示し、図２（Ｄ）は、スポット光が再点灯した状態を示す図である。

【図３】スポット光の発光状態と機能との関係を示す模式図である。

【図４】レーザー光の投射距離とスポット光のずれ量との関係を示す模式図である。

【図５】本実施の形態の一例に係るシステムの機能ブロック図である。

【図６】本実施の形態の一例に係る指示動作の検出の流れを示すフローチャートである。

【図７】画像表示領域におけるカーソルとアイコンの状態を示す図であり、図７（Ａ）は、カーソル移動時の状態を示し、図７（Ｂ）は、カーソルがアイコンに重なった状態を示し、図７（Ｃ）は、クリック認識時のカーソルの表示状態を示し、図７（Ｄ）は、ドラッグ認識時のカーソルの表示状態を示す図である。

【図８】画像表示領域におけるカーソルとアイコンの状態を示す他の図であり、図８（Ａ）は、画像表示領域の中央付近にアイコンをカーソルで指示している状態を示し、図８（Ｂ）は、右端付近にあるアイコンを従来のカーソルで指示している状態を示し、図８（Ｃ）は、右端付近にあるアイコンを本実施形態のカーソルで指示している状態を示す図である。

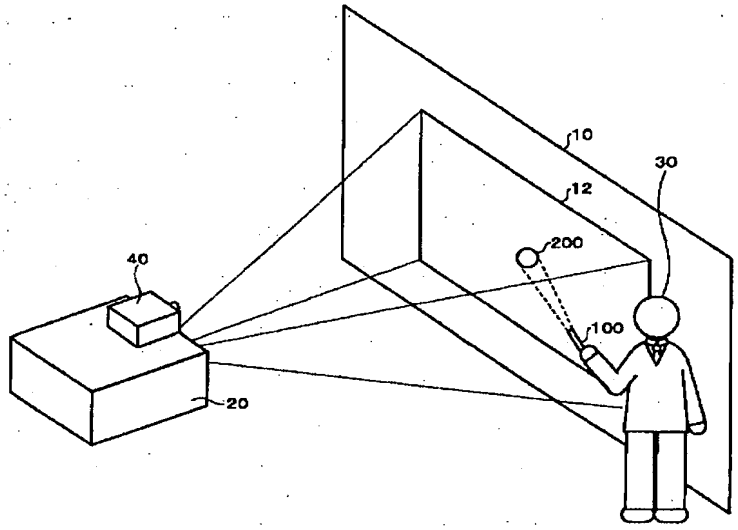
【図９】本実施の形態の一例に係る処理部のハードウェア構成の説明図である。

【符号の説明】

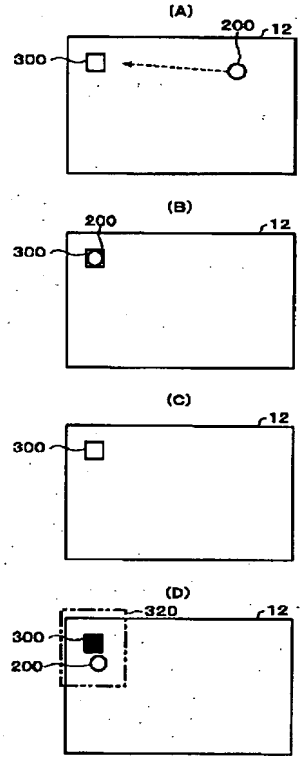
１２　画像表示領域
２０　プロジェクタ
３０　プレゼンター
４０　ＣＣＤカメラ

１００　レーザーポインタ
５１０　位置検出部
５２０　画像生成部
５４０　判定部
５５０　制御部
１００６　情報記憶媒体

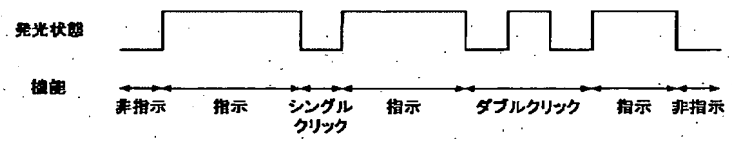
【図１】



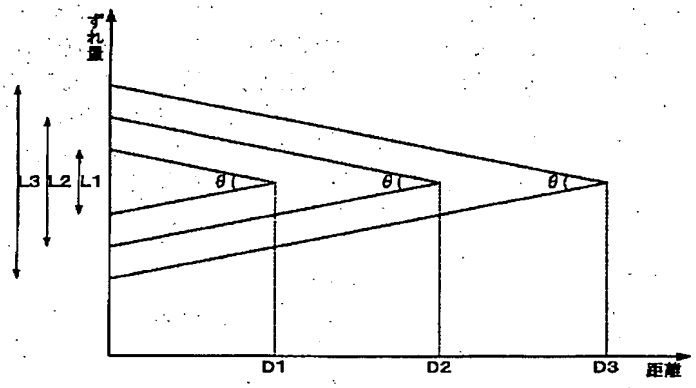
【図２】



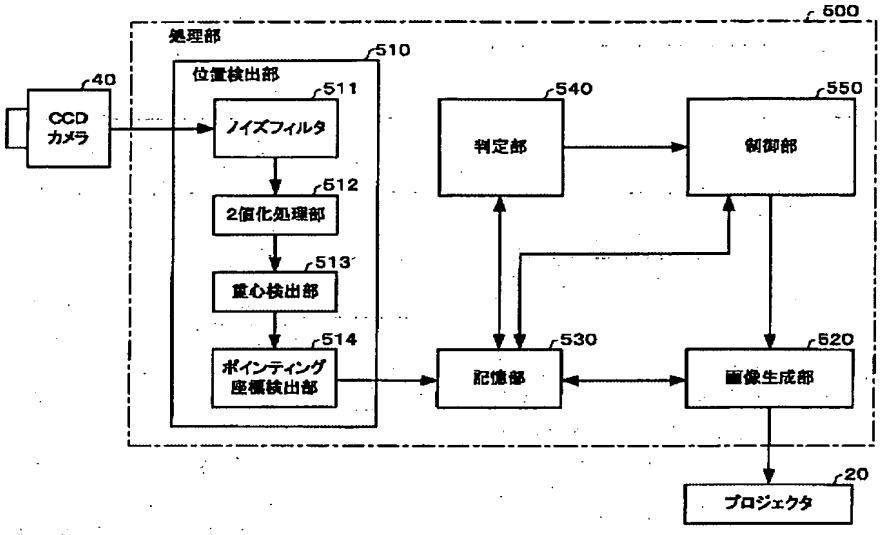
【図３】



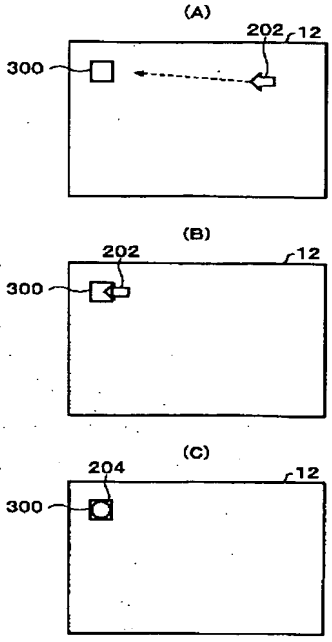
【図４】



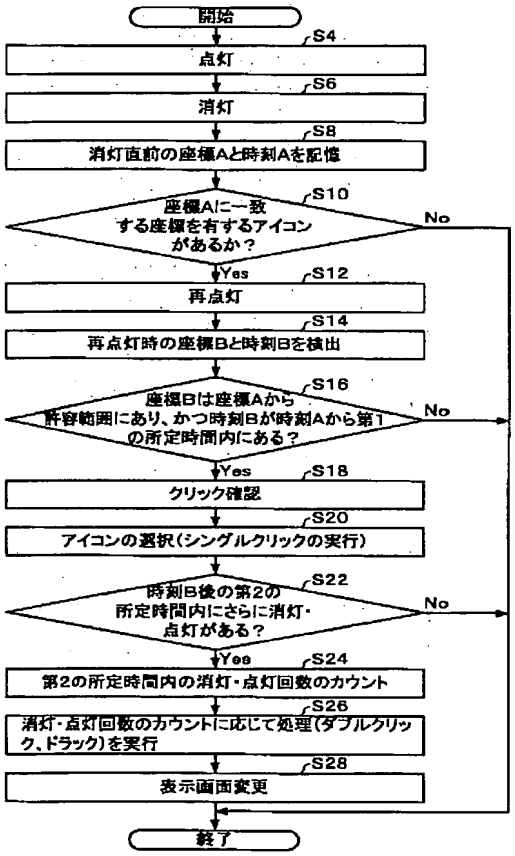
【図５】


500
処理部
510
位置検出部
40
CCD
カメラ
511
ノイズフィルタ
512
2値化処理部
513
重心検出部
514
ポインティング
座標検出部
540
判定部
550
制御部
530
記憶部
520
画像生成部
20
プロジェクタ

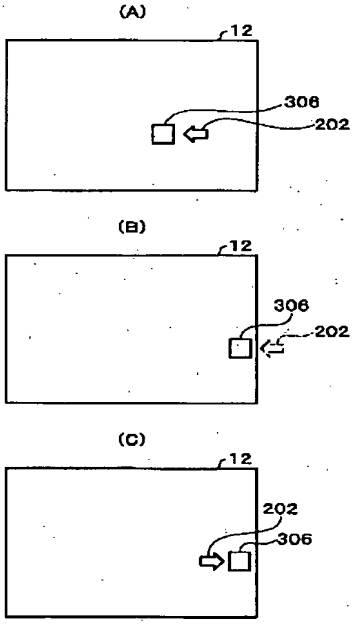
【図７】


(A)
202
12
300
(B)
202
12
300
(C)
204
12
300
(D)
300
206
12

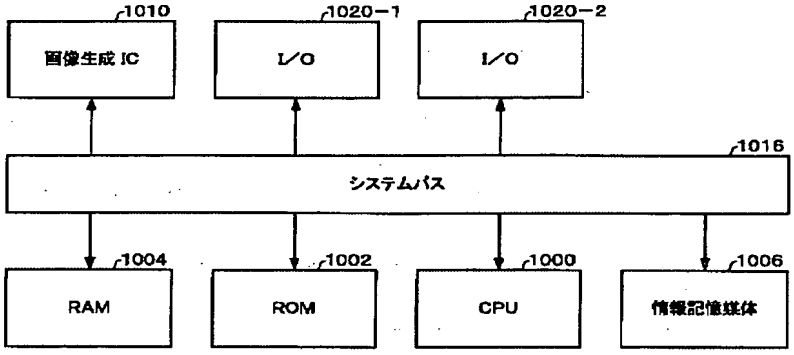
【図６】


開始
S4
点灯
S6
消灯
S8
消灯直前の座標Aと時刻Aを記憶
S10
座標Aに一致する座標を有するアイコンがあるか？
No
Yes
S12
再点灯
S14
再点灯時の座標Bと時刻Bを検出
S16
座標Bは座標Aから許容範囲にあり、かつ時刻Bが時刻Aから第1の所定時間内にある？
No
Yes
S18
クリック確認
S20
アイコンの選択（シングルクリックの実行）
S22
時刻B後の第2の所定時間内にさらに消灯・点灯がある？
No
Yes
S24
第2の所定時間内の消灯・点灯回数のカウント
S26
消灯・点灯回数のカウントに応じて処理（ダブルクリック、ドラック）を実行
S28
表示画面変更
終了

【図８】


(A)
12
306
202
(B)
12
306
202
(C)
12
202
306

【図９】


1010
画像生成 IC
1020−1
I/O
1020−2
I/O
1016
システムバス
1004
RAM
1002
ROM
1000
CPU
1006
情報記憶媒体

PATENT ABSTRACTS OF JAPAN

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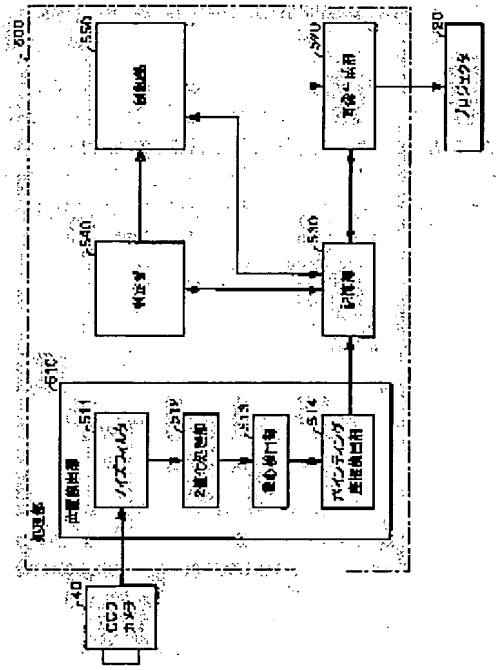
(54) PICTURE GENERATION SYSTEM AND PRESENTATION SYSTEM AND INFORMATION STORAGE MEDIUM



(57)Abstract:

PROBLEM TO BE SOLVED: To provide a picture generation system, a presentation system, and an information storage medium capable of visually understandable showing an instructed operation without using any special instructing tool.

SOLUTION: This picture generation system is provided with a center of gravity detecting part 513 for detecting the center of gravity position of a spot light from a laser pointer based on image pickup information from a CCD camera 40, a pointing coordinate detecting part 514 for detecting pointing coordinates based on the center of gravity position, a storage part 530 for storing the coordinate position of the spot light at the time of turning off the spot light, and a deciding part 540 for deciding whether or not the coordinate position of the spot light at the time of turning off the spot light and the coordinate position of the spot light at the time of re-turning on the spot light are present in a prescribed allowable range. When it is decided that the coordinate position is present in the allowable range by the deciding part 540, it is discriminated that a series of operations such as click operations are performed, and a picture corresponding to the click operations or the like is generated by using a picture generating part 520.

CLAIMS

[Claim(s)]

[Claim 1] In the image generative system which generates the image displayed on the predetermined image display field to which it is projected on the light for directions by the optical pointer An image pick-up means to picturize said image display field, and a directions location detection means to detect the directions location by said optical pointer based on the

image pick-up information by the image pick-up means concerned, A distinction means to detect flashing of said light based on said image pick-up information, and to distinguish the contents of directions, The image generative system characterized by including the control means which controls an image generation means so that the image corresponding to the contents of directions which are the images displayed on said image display field, and were distinguished by the directions location based on the location detection information on said directions location detection means and said distinction means is displayed.
[Claim 2] It is the image generative system characterized by controlling said image generation means so that said distinction means distinguishes click actuation in claim 1 based on flashing of said light and the icon image to which said control means changed either [at least] the color of said icon image or the configuration when said click actuation was performed by the viewing area of a predetermined icon image in said image display field is displayed .
[Claim 3] It is the image generative system which sets to either of claims 1 and 2, and is characterized by distinguishing said distinction means as a series of directions actuation if the difference of the directions location at the time of putting out lights of said light and the directions location at the time of re-lighting of said light is predetermined within the limits.
[Claim 4] The actuation direction of the flashing switch concerned is an image generative system characterized by enlarging relatively about the actuation direction of the flashing switch of said optical pointer compared with the direction where said distinction means differ the range of said difference in claim 3.
[Claim 5] It is the image generative system characterized by controlling said image generation means so that the cursor for directions is displayed near [based on the location detection information on said directions location detection means in said control means] a directions location in either of claims 1-4.
[Claim 6] When the directions location where said cursor for directions which directs the directions location in said image display field out of said image display field is displayed is directed to said control means by said optical pointer in claim 5, The image generative system characterized by controlling said image generation means so that said cursor for directions may be displayed in said image display field and the image which adjusted the display position and the display direction of said cursor for directions is displayed.
[Claim 7] The presentation system characterized by including an image generative system according to claim 1 to 6 and a projection means to project the image for presentations generated with said image generation means towards said image display field.
[Claim 8] It is the information storage medium which memorized the information for generating the image displayed on the predetermined image display field to which it is projected on the light for directions by the optical pointer and in which computer reading is possible. Said information A directions location detection means to detect the directions location by said optical pointer based on the image pick-up information on said image display field, A distinction means to detect flashing of said light based on said image pick-up information, and to distinguish the contents of directions, The control means which controls an image generation means so that the image corresponding to the contents of directions which are the images displayed on said image display field, and were distinguished by the directions location based on the location detection information on said directions location detection means and said distinction means is displayed, The information storage medium characterized by including the information for realizing.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the image generative system, presentation system, and information storage medium which generate the image with which the directions which used the light for directions are performed.
[0002]
[A background technique and Object of the Invention] There was only a function to only direct the image on a screen in optical pointers, such as a common laser pointer used by the presentation system using a liquid crystal projector etc., and the usual PC actuation and the

click function of a mouse had it to them.
[0003] Therefore, the directions person needed to move directions with a laser pointer to the location which once has a stop, a keyboard, and a mouse for keyboard grabbing of PC (Personal Computer), or mouse actuation, after directing the desired location with the laser pointer. For this reason, the flow of directions stopped, the audience could concentrate a directions person's talk, and could not hear it and a directions person was not able to do smooth directions further, either.
[0004] Moreover, in order to solve this problem, two or more carbon buttons are prepared in an optical pointer, and the optical pointer which assigned functions, such as drawing an underline on each carbon button, is proposed.
[0005] For example, when the function which draws an underline was assigned to one of the carbon buttons of a laser pointer and a presenter pushed the carbon button concerned, actuation which draws an underline to the alphabetic character currently displayed as some presentation images was performed.
[0006] However, it was in the condition which becomes heavy and cannot be said to be very comfortable [the operability or the portability at the time of directions actuation] when two or more carbon buttons are prepared in a laser pointer and the laser pointer itself becomes large.
[0007] Moreover, even when the click directions of the icon on a presentation image were carried out by mouse actuation etc. for example, change of a display of an icon image was conventionally scarce. For this reason, it was incomprehensible in whether it is a click also not only for an audience but for a directions person, and whether it is a drag.
[0008] This invention is made in view of the above-mentioned technical problem, and the purpose is in the directions actuation by the optical pointer offering an intelligible image generative system, a presentation system, and an information storage medium visually, without using a special optical pointer.
[0009]
[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the image generative system concerning this invention In the image generative system which generates the image displayed on the predetermined image display field to which it is projected on the light for directions by the optical pointer An image pick-up means to picturize said image display field, and a directions location detection means to detect the directions location by said optical pointer based on the image pick-up information by the image pick-up means concerned, A distinction means to detect flashing of said light based on said image pick-up information, and to distinguish the contents of directions, It is the image displayed on said image display field, and is characterized by including the control means which controls an image generation means so that the image corresponding to the contents of directions distinguished by the directions location based on the location detection information on said directions location detection means and said distinction means is displayed.
[0010] Moreover, the information storage medium concerning this invention is an information storage medium which memorized the information for generating the image displayed on the predetermined image display field to which it is projected on the light for directions by the optical pointer and in which computer reading is possible. A directions location detection means by which said information detects the directions location by said optical pointer based on the image pick-up information on said image display field, A distinction means to detect flashing of said light based on said image pick-up information, and to distinguish the contents of directions, The control means which controls an image generation means so that the image corresponding to the contents of directions which are the images displayed on said image display field, and were distinguished by the directions location based on the location detection information on said directions location detection means and said distinction means is displayed, It is characterized by including the information (for example, program etc.) for realizing.
[0011] Moreover, the program concerning this invention is characterized by including the module for realizing each above-mentioned means.
[0012] According to this invention, without using a special optical pointer, flashing of the light from an optical pointer can be detected, the contents of directions can be distinguished, and the image corresponding to the distinguished contents of directions can be generated.
[0013] Thereby, the image which reflected the contents of directions only using the optical pointer can be displayed, without using a keyboard, a mouse, etc.

[0014] A directions person can direct the image corresponding to the contents of directions, without having an optical pointer, a keyboard, a mouse, etc. again. Therefore, a directions person can tell an audience his contents of actuation efficiently, and it is easier for an audience to understand the contents of directions.
[0015] Here, as an image corresponding to said contents of directions, the image which changed the icon into the selection condition, the image to which an icon is moved, the image at the time of activation of the application program related with the icon, etc. correspond, for example. That is, the image corresponding to said contents of directions may be a static image, or may be a dynamic image.
[0016] Moreover, in said image generative system, said information storage medium, and said program, said distinction means distinguishes click actuation based on flashing of said light, and when said click actuation is perform by the viewing area of the predetermined icon image in said image display field, it is desirable [said control means] to control said image generation means so that the icon image to which either [at least] the color of said icon image or the configuration was changed is display.
[0017] As for a directions person, according to this, it turns out visually that click actuation was distinguished.
[0018] Moreover, it is easily discriminable that the operator of an optical pointer is performing click actuation by this for those who are looking at the image concerned.
[0019] In said image generative system, said information storage medium, and said program moreover, said distinction means Based on flashing and migration of said light, drag actuation is distinguished and it sets to said image generative system, said information storage medium, and said program. Said control means When said drag actuation is performed by the viewing area of the predetermined icon image in said image display field, It is desirable to control an image generation means so that it is displayed that the icon image to which either [at least] the color of said icon image or the configuration was changed is generated, and the icon image concerned is moved based on migration of said light.
[0020] As for a directions person, according to this, it turns out visually that drag actuation was distinguished.
[0021] Moreover, it is easily discriminable that the operator of an optical pointer is performing drag actuation for those who are looking at the image concerned.
[0022] Moreover, it sets to said image generative system, said information storage medium, and said program, and if the difference of the directions location at the time of putting out lights of said light and the directions location at the time of re-lighting of said light is predetermined within the limits, it is desirable [said distinction means] to distinguish as a series of directions actuation.
[0023] According to this, by preparing predetermined tolerance, when directing by blinking light, even when there is some blurring, it can distinguish as directions actuation appropriately.
[0024] Moreover, as for said distinction means, in said image generative system, said information storage medium, and said program, it is desirable to enlarge the range of said difference relatively about the actuation direction of the flashing switch of said optical pointer compared with a different direction from the actuation direction of the flashing switch concerned.
[0025] According to this, incorrect detection can be reduced by setting up the tolerance which widened the direction where blurring tends to occur. Therefore, directions actuation can be distinguished more appropriately.
[0026] For example, when performing flashing actuation of light by pushing down a flashing switch, light tends to blur downward. Therefore, in consideration of blurring of the light concerned, suitable tolerance can be set up by extending tolerance downward.
[0027] Moreover, as for said control means, in said image generative system, said information storage medium, and said program, it is desirable to control said image generation means so that the cursor for directions is displayed near [based on the location detection information on said directions location detection means] a directions location.
[0028] In said image generative system, said information storage medium, and said program moreover, said control means When the directions location where said cursor for directions which directs the directions location in said image display field is displayed outside said image display field is directed by said optical pointer, so that said cursor for directions may be displayed in said

image display field It is desirable to control said image generation means so that the image which adjusted the display position and the display direction of said cursor for directions is displayed.
[0029] According to this, even when the cursor for directions of a leftward arrow-head configuration has protruded only a few from the left end of an image display field outside an image display field, a directions location can be appropriately directed by changing the cursor for directions into the display of a rightward arrow-head configuration, for example.
[0030] Moreover, the presentation system concerning this invention is characterized by including a projection means to project the above-mentioned image generative system and the image for presentations generated with said image generation means towards said image display field.
[0031] According to this invention, in a presentation, directions actuation can realize an intelligible presentation system visually, without using a special optical pointer.
[0032]
[Embodiment of the Invention] The case where this invention is hereafter applied to the presentation system which directs using an optical pointer is taken for an example, and it explains, referring to a drawing.
[0033] (System-wide explanation) Drawing 1 is the approximate account Fig. of the presentation system concerning an example of the gestalt of this operation.
[0034] The image for predetermined presentations is projected from the projector 20 of a screen mostly prepared in the transverse plane. A presenter 30 performs the presentation to a third person, pointing to the location of a request of the image of the field 12, i.e., an image display field, where the image on a screen 10 is displayed with the laser pointer 100.
[0035] If a presenter 30 directs the location of a request of the image display field 12 on a screen using the spot light 200 on which it is projected from the laser pointer 100, it will be mostly prepared in a transverse plane and part and spot light 200 of the image display field 12 and a presenter 30 will be picturized as a directions image by CCD camera 40 of the image display field 12 which functions as an image pick-up means.
[0036] Image processings, such as center-of-gravity detection processing, are performed, and, as for a directions image, the center-of-gravity location of the spot light 200 is detected as a directions location.
[0037] Thus, when projecting a presentation image and directing the icon on a presentation image with the laser pointer 100, for an audience, it is incomprehensible in whether it is a click and whether by the usual technique, since change of an icon image is scarce, it is a drag.
[0038] Moreover, when realizing functions, such as drawing an underline, using the laser pointer 100 into a desired part among presentation images and laser pointer 100 the very thing will become large if two or more carbon buttons are prepared in the laser pointer 100, it will become heavy and the operability and the portability at the time of directions actuation will be in the condition that it cannot be said that it is very comfortable.
[0039] Then, it enables it to perform intelligible directions actuation visually with the gestalt of this operation using the usual laser pointer 100, without using a keyboard, a mouse, or a highly efficient laser pointer.
[0040] Drawing 2 (B) shows the condition that the spot light 200 lapped with the icon 300, drawing 2 is drawing showing the condition of the spot light 200 in the image display field 12, and an icon 300, and drawing 2 (D) is [drawing 2 (A) shows the condition at the time of spot light 200 migration, and / drawing 2 (C) shows the condition that the spot light 200 disappeared, and] drawing showing the condition that the spot light 200 re-lit up.
[0041] Here, a presenter assumes performing click directions of an icon 300 by flashing actuation of the laser pointer 100.
[0042] As shown in drawing 2 (A), when a presenter moves the tip of the laser pointer 100 leftward, the spot light 200 also moves leftward toward an icon 300.
[0043] As shown in drawing 2 (B), a presenter 30 moves the tip of the laser pointer 100 leftward to the point where the spot light 200 laps with an icon 300.
[0044] And when the spot light 200 laps with an icon 300, as shown in drawing 2 (C), a presenter 30 turns OFF the flashing switch of the laser pointer 100, and extinguishes the spot light 200.
[0045] Immediately after turning OFF a switch, a presenter 30 turns ON the flashing switch of the laser pointer 100, and makes the spot light 200 re-turn on, as shown in drawing 2 (D).
[0046] By identifying the above flashing actuation, a processor can be recognized for the

presenter having performed click actuation by flashing actuation.
[0047] By recognizing click actuation, a processor changes the color of an icon 300, as shown in drawing 2 (D).
[0048] Thereby, an audience can distinguish easily that the presenter is performing click actuation.
[0049] Next, the relation between the spot light 200 and each function, such as click actuation, is explained more to a detail.
[0050] Drawing 3 is the mimetic diagram showing the relation between the luminescence condition of the spot light 200, and a function.
[0051] A luminescence condition shows the condition of the switch OFF of a lower line in the condition of the switch ON of the upper line.
[0052] For example, in an initial state, a switch is OFF and is in the condition of un-directing. If a switch is turned on, a directions function as shown in drawing 2 (A) will work.
[0053] And when it is set to OFF (disappearance) from the condition of ON of a switch within predetermined time and is further set to ON (re-lighting), the function as a single click works.
[0054] Then, in the state of Switch ON, a directions function works again.
[0055] And it is set to OFF (disappearance) and ON (re-lighting) from the condition of ON of a switch within predetermined time, and further, when set to OFF (re-disappearance) and ON (re-lighting), the function as a double click works.
[0056] Then, in the state of Switch ON, a directions function works again, and it is un-directing in the state of Switch OFF.
[0057] Thus, various functions are realizable when at least flashing actuation of the spot light 200 detects the count of flashing and flashing spacing.
[0058] Moreover, with the gestalt of this operation, in the case of flashing actuation of the spot light 200, as shown in drawing 2 (D), tolerance 320 is formed to the gap of the location at the time of disappearance of the spot light 200 and re-lighting. That is, if the difference of the directions location by the spot light 200 at the time of re-lighting and the directions location at the time of disappearance is settled in tolerance 320, even if directions locations differ somewhat, it will recognize as a series of directions actuation.
[0059] Especially about the tolerance 320, as shown in drawing 2 (D), the vertical direction is set up width to the longitudinal direction. This is because the switch of the laser pointer 100 is formed so that it may be pushed in the vertical direction, and the amount of blurring of the vertical direction is considered to be large compared with the amount of blurring of a longitudinal direction at the time of actuation of a switch. Furthermore, lower tolerance may be set up among the vertical directions more greatly than the bottom.
[0060] In addition, when the switch of the laser pointer 100 is formed so that it may be pushed on a longitudinal direction, it is desirable to set up a longitudinal direction width for tolerance 320 to the vertical direction.
[0061] Thus, by forming tolerance 320, even when there is some blurring, it can distinguish as directions actuation appropriately.
[0062] Moreover, directions actuation can be more appropriately distinguished by setting up the tolerance 320 which widened the direction where blurring tends to occur.
[0063] In addition, with the gestalt of this operation, it is taking into consideration also about the relation between the such amount of blurring of gaps, i.e., the amount of the spot light 200, and the projector distance of laser light.
[0064] Drawing 4 is the mimetic diagram showing the relation between the projector distance of laser light, and the amount of gaps of the spot light 200.
[0065] Even if the blurring include angle is fixed as theta, the amount of gaps of the spot light 200 becomes large with L1, L2, and L3, as the distance from the laser pointer 100 to the image display field 12 becomes long with D1, D2, and D3.
[0066] Therefore, when the distance from the laser pointer 100 to the image display field 12 becomes long, it is desirable to also set up tolerance 320 more greatly.
[0067] (Explanation about functional block) Next, functional block of this system for realizing these functions is explained.
[0068] Drawing 5 is the functional block diagram of the system concerning an example of the gestalt of this operation.
[0069] This system is constituted including CCD camera 40 which is an image pick-up means,

the processing section 500, and the projector 20 (liquid crystal projector of a front projection mold) which is a projection means.
[0070] Moreover, the processing section 500 is constituted including the location detecting element 510 which detects a directions location based on the image pick-up signal of CCD camera 40, and the image generation section 520 which generates the image information for displaying on the image of cursor 200, the image of an icon 300, and the image display field 12 etc. based on the detection result of a directions location, and is outputted to a projector 20.
[0071] A location detecting element 510 is more specifically constituted including the noise filter 511 from which the noise of an image pick-up image removes, the binary-ized processing section 512 which perform binary-ization so that it may be easy to perform data processing to image pick-up information, the center-of-gravity detecting element 513 which detect the center of gravity of the spot light 200 based on the image pick-up information made binary, and the pointing coordinate detecting element 514 which detect a directions location (a pointing location) based on the detected center-of-gravity location.
[0072] Moreover, the processing section 500 is constituted including the directions location at the time of disappearance of the spot light 200 mentioned above, tolerance 320, the storage section 530 that memorizes an application program etc. further, whether the directions location at the time of re-lighting is in tolerance 320 and the judgment section 540 to judge, and the control section 550 which controls the image generation section 520 based on this judgment result.
[0073] In addition, about the hardware configuration of the processing section 500, it mentions later.
[0074] Next, it explains using a flow chart that detection of directions actuation flows using each part mentioned above.
[0075] (Explanation about detection of directions actuation flowing) Drawing 6 is a flow chart which shows the flow of detection of the directions actuation concerning an example of the gestalt of this operation.
[0076] Here, click actuation is mainly explained.
[0077] A presenter 30 turns on the laser pointer 100 and directs the image display field 12 (step S4).
[0078] The location detecting element 510 detects the spot light 200 using the image pick-up information from CCD camera 40, and detects a directions coordinate by the pointing coordinate detecting element 514.
[0079] When the spot light 200 laps with an icon 300, a presenter 30 switches off the laser pointer 100, in order to perform click actuation, as shown in drawing 2 (A) - drawing 2 (C) (step S6).
[0080] At this time, the pointing coordinate detecting element 514 memorizes the directions coordinate A in front of putting out lights, and the putting-out-lights time of day A in the storage section 530 (step S8).
[0081] And the judgment section 540 is generated in the image generation section 520, and judges whether based on the image information memorized by the storage section 530, the icon 300 which has the coordinate which is in agreement with Coordinate A is displayed on the current screen (step S10).
[0082] And as shown in drawing 2 (D), in order that a presenter 30 may perform click actuation, the laser pointer 100 is re-turned on (step S12).
[0083] The pointing coordinate detecting element 514 detects the directions coordinate B and time of day B at the time of re-lighting, and memorizes them in the storage section 530 (step S14).
[0084] The judgment section 540 judges whether the coordinate location A at the time of putting out lights memorized by the storage section 530 is compared with the coordinate location B at the time of re-lighting, and it is in tolerance 320. Furthermore, the judgment section 540 judges whether the time of day A at the time of putting out lights memorized by the storage section 530 was compared with the time of day B at the time of re-lighting, and re-lighting was performed in the 1st predetermined time (step S16).
[0085] It is recognized as it being in tolerance 320, and the judgment section 518 being the 1st click actuation, when re-lighting is performed in predetermined time amount (step S18).
[0086] When it has been recognized as the judgment section 518 being the 1st click actuation, an instruction is given to a control section 550 so that the image of the icon 300 which is in

agreement with the coordinate location A grasped at step S10 may be changed.
[0087] A control section 550 controls the image generation section 520 based on the instruction concerned to change the image of an icon 300.
[0088] By the control concerned, the image generation section 520 generates image information so that the image with which the icon 300 as shown in drawing 2 (D) was chosen may be displayed, and it outputs the image information concerned to a projector 20.
[0089] A projector 20 projects an image based on the image information concerned. It means that the image with which the icon 300 as shown in drawing 2 (D) was chosen by this is displayed, and the single click was performed (step S20).
[0090] Furthermore, it judges whether the judgment section 540 has putting out lights and lighting into the 2nd [after time of day B] predetermined time (step S22).
[0091] Moreover, the judgment section 540 memorizes the counted value which shows whether there were how many times putting out lights and lighting, respectively in the storage section 530, when putting out lights and lighting are in the 2nd [after time of day B] predetermined time (step S24).
[0092] And when counted value turns into a predetermined value, or when it goes through the 2nd predetermined time, the judgment section 540 gives an instruction to a control section 550 so that processing (a double click, drag) may be performed according to counted value.
[0093] Based on the instruction concerned, a control section 550 controls the image generation section 520 so that processing according to the contents of directions is performed.
[0094] For example, when the image generation section 520 judges whether the predetermined application program is related with the icon 300 with reference to the storage section 300 in a double click and the related attachment concerned is carried out, the image information for displaying the image at the time of application program activation is generated (step S26).
[0095] And a projector 20 projects the image at the time of application program activation on a screen 10 like the flow of the processing mentioned above.
[0096] Thereby, the display screen on a screen 10 is changed and a presenter 30 and an audience can recognize visually that double-clicked the icon 300 and the application program was performed (step S28).
[0097] As mentioned above, according to the gestalt of this operation, click actuation etc. can be performed using the common laser pointer 100, without using a mouse, a keyboard, etc. Moreover, by changing the image of an icon 300 in the cases, such as click actuation, for a presenter 30 and an audience, it is visually intelligible and a presentation can be performed effectively.
[0098] Moreover, with the gestalt of this operation, the judgment section 540 judges whether based on the count of flashing of the spot light 200 detected by the pointing coordinate detecting element 514, the presenter 30 performed actuation for display which image among a click image (image which changed the icon into the selection condition), a drag image (image to which an icon is move), the image at the time of a double click (image at the time of activation of the application program related with the icon), etc.
[0099] For example, processing becomes heavy although it is also possible to detect change of a motion of the spot light 200 and to grasp a presenter's 30 contents of actuation. By judging by the count of flashing of the spot light 200, the location detecting element 510 and judgment section 518 grade can be realized with a simple configuration, and it can judge quickly.
[0100] (Example using cursor) It is also possible to change the display of the cursor it not only changes the display of an icon 300, but displayed in addition on the detected directions location by following. Here, it assumes displaying the cursor of an arrow-head configuration at the time of directions, displaying the cursor of a circle configuration at the time of a click, and displaying elliptical cursor at the time of a drag.
[0101] Drawing 7 (B) shows the condition that cursor lapped with the icon, drawing 7 is drawing showing the condition of the cursor in an image display field, and an icon, and drawing 7 (D) is [drawing 7 (A) shows the condition at the time of a cursor advance, and / drawing 7 (C) shows the display condition of the cursor at the time of click recognition, and] drawing showing the display condition of the cursor at the time of drag recognition.
[0102] As shown in drawing 7 (A), a presenter 30 moves the tip of an optical pointer leftward, and brings the cursor 202 of a leftward arrow-head configuration close to an icon 300.
[0103] And as shown in drawing 7 (B), when a presenter 30 overlaps the tip of the arrow head of

cursor 202 with an icon 300, he once puts out the light, and is re-turned on immediately. Thereby, it is recognized as the judgment section 518 being click actuation, and an instruction is issued so that it may become the configuration of the cursor which suited click actuation at the image generation section 520.

[0104] By issuing such an instruction, as shown in drawing 7 (C), the image generation section 520 generates the image of the cursor 204 of a circle configuration, and a projector 20 indicates the image of the cursor 204 of a circle configuration by projection.

[0105] Moreover, at the time of drag actuation, after a presenter 30 turns ON the switch of an about [5 second] light pointer and turns OFF, he performs drag actuation by turning ON immediately and moving the tip of an optical pointer.

[0106] The judgment section 518 which has recognized that such actuation was performed issues an instruction so that it may become the configuration of the cursor which suited drag actuation at the image generation section 520.

[0107] By issuing such an instruction, as shown in drawing 7 (D), the image generation section 520 generates the image of the elliptical cursor 206, and a projector 20 indicates the image of the elliptical cursor 206 by projection. In addition, at the time of drag actuation, a projector 20 indicates by projection so that an icon 300 and cursor 206 may be moved to compensate for migration of the light from an optical pointer.

[0108] Thus, a presenter 30 can perform intelligible directions actuation visually for an audience not only the icon 300 but by changing the display of cursor 202-206.

[0109] Furthermore, with the gestalt of this operation, cursor 202 is displayed that the cursor 202 for directions can tend to be seen also in the endpoint of the image display field 12.

[0110] Drawing 8 is other drawings showing the condition of the cursor 202 in the image display field 12, and an icon 300. Drawing 8 (A) The condition of directing the icon 300 near the center of an image display field with cursor 202 is shown. Drawing 8 (B) The condition of directing the icon 300 near a right end with the conventional cursor 202 is shown, and drawing 8 (B) is drawing showing the condition of directing the icon 300 near a right end with the cursor 202 of this operation gestalt.

[0111] For example, as shown in drawing 8 (A), when an icon 300 is near the center of an image display field in the usual condition, it is possible to direct with the cursor 202 of a leftward arrow-head configuration.

[0112] However, to an icon 300, as shown in drawing 8 (B), even if it is going to direct the icon 300 near a right end with the cursor 202 of a leftward arrow-head configuration, since the location of cursor 202 is right-hand side, cursor 202 will protrude it from the image display field 12. For this reason, in fact, in spite of being able to direct, cursor 202 is no longer displayed.

[0113] With the gestalt of this operation, as shown in drawing 8 (C), when directing the icon 300 near a right end with the cursor 202 of a leftward arrow-head configuration, such a problem is solved by making the sense of cursor 202 reverse and displaying cursor 202 on the left-hand side of an icon 300.

[0114] For example, by adjusting the sense and location of cursor 202, if the range of the flash is in predetermined tolerance when the judgment section 518 distinguishes that the display position of cursor 202 overflows the image display field 12 based on the detection result of the pointing coordinate detecting element 514, the image generation section 520 will be controlled so that cursor 202 is displayed in the image display field 12.

[0115] Thus, according to the gestalt of this operation, even when cursor 202 overflows outside the image display field 12, cursor 202 can be displayed appropriately.

[0116] (Explanation about a hardware configuration) Next, the hardware configuration of the processing section 500 is explained.

[0117] Drawing 9 is the explanatory view of the hardware configuration of the processing section 500 concerning an example of the gestalt of this operation.

[0118] With the equipment shown in this drawing, the image generation IC 1010 and I/O (input/output port) 1020-1 which realize the function of CPU1000 and ROM1002 which realize the function of the location detecting element 510, the judgment section 540, and a control section 550, RAM1004 which realizes the function of the storage section 530, the information storage medium 1006, and the image generation section 520, and 1020-2 are mutually connected by the system bus 1016 possible [data transmission and reception]. And it connects with the device of CCD camera 40 and projector 20 grade through I/O 1020-1 and 1020-2.

[0119] As for the information storage medium 1006, a program, a module, etc. are stored. In addition, as an information storage medium 1006, hard disks which make information read with the MAG, such as CD-ROM, DVD-ROM, etc. which make information read by laser light, memory, etc. are applicable, for example. Moreover, a contact method or a non-contact method is sufficient as the reading method of the information from an information storage medium.
[0120] Moreover, various kinds of processings in which it explained by drawing 1 - drawing 8 are realized by the information storage 1006 which stored the program for performing these processings, and CPU1000 and the image generation IC1010 grade which are operated according to the program concerned. In addition, CPU1000, general-purpose DSP, etc. may perform by software processing performed in image generation IC1010 grade.
[0121] Moreover, it is also possible to realize each function mentioned above by downloading the program for replacing with the information storage medium 1006 and realizing each function mentioned above etc. from host equipment etc. through a transmission line. That is, the information for realizing each function mentioned above may be embodied by the subcarrier (embodied).
[0122] As mentioned above, although the gestalt of the suitable operation which applied this invention has been explained, application of this invention is not limited to the example mentioned above.
[0123] (Other examples) For example, as modification of an icon 300 and a display of cursor 202 grade, you may be modification of only a configuration, modification of only a color, and modification of both a configuration and a color. Specifically, a flashing display, inverse video, etc. may be performed. These can also show the directions actuation by the operator of an optical pointer intelligibly visually. In addition, an optical pointer is not restricted to the laser pointer mentioned above, but can apply the pointer which projects various kinds of light, such as an infrared pointer.
[0124] Moreover, it is also possible to perform processing which judges the contents of directions and sounds a sound with the gestalt of this operation, for example although the example which judges the contents of directions and generates an image was explained in which the part which has judged the contents of directions is vibrated.
[0125] Moreover, this invention can be applied, also when a display means performs image display and it performs a presentation etc. besides a projection means like a projector mentioned above. As such a display means, display units, such as CRT (CathodeRay Tube), PDP (Plasma Display Panel), FED (Field Emission Display) and EL (Electro Luminescence) besides a liquid crystal projector, and a direct viewing type liquid crystal display, etc. correspond, for example.
[0126] Moreover, each part of the processing section 500 may be built in a projector 20, may be built in the external device of the projectors 20, such as PC, and may be shared and built in with a projector 20, PC, etc.
[0127] Furthermore, although the example mentioned above explained the example which applied the projector of a front projection mold, it is also possible to apply the projector of a tooth-back projection mold.
[0128] Moreover, this invention is not limited to a presentation system, but can be applied also to various kinds of image generative systems which detect a directions location and generate an image based on a detection result.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the approximate account Fig. of the presentation system concerning an example of the gestalt of this operation.
[Drawing 2] Drawing 2 (B) shows the condition that spot light lapped with the icon, it is drawing showing the condition of the spot light in an image display field, and an icon, and drawing 2 (D) is [drawing 2 (A) shows the condition at the time of spot light migration, and / drawing 2 (C) shows the condition that spot light disappeared, and] drawing showing the condition that spot light re-lit up.
[Drawing 3] It is the mimetic diagram showing the relation between the luminescence condition of spot light, and a function.

[Drawing 4] It is the mimetic diagram showing the relation between the projector distance of laser light, and the amount of gaps of spot light.
[Drawing 5] It is the functional block diagram of the system concerning an example of the gestalt of this operation.
[Drawing 6] It is the flow chart which shows the flow of detection of the directions actuation concerning an example of the gestalt of this operation.
[Drawing 7] Drawing 7 (B) shows the condition that cursor lapped with the icon, it is drawing showing the condition of the cursor in an image display field, and an icon, and drawing 7 (D) is [drawing 7 (A) shows the condition at the time of a cursor advance, and / drawing 7 (C) shows the display condition of the cursor at the time of click recognition, and] drawing showing the display condition of the cursor at the time of drag recognition.
[Drawing 8] It is drawing showing the condition that are other drawings showing the condition of the cursor in an image display field, and an icon, and drawing 8 (A) shows the condition of directing the icon near the center of an image display field with cursor, drawing 8 (B) shows the condition are directing the icon near a right end with the conventional cursor, and drawing 8 (C) is directing the icon near a right end with the cursor of this operation gestalt.
[Drawing 9] It is the explanatory view of the hardware configuration of the processing section concerning an example of the gestalt of this operation.
[Description of Notations]
12 Image Display Field
20 Projector
30 Presenter
40 CCD Camera
100 Laser Pointer
510 Location Detecting Element
520 Image Generation Section
540 Judgment Section
550 Control Section
1006 Information Storage Medium

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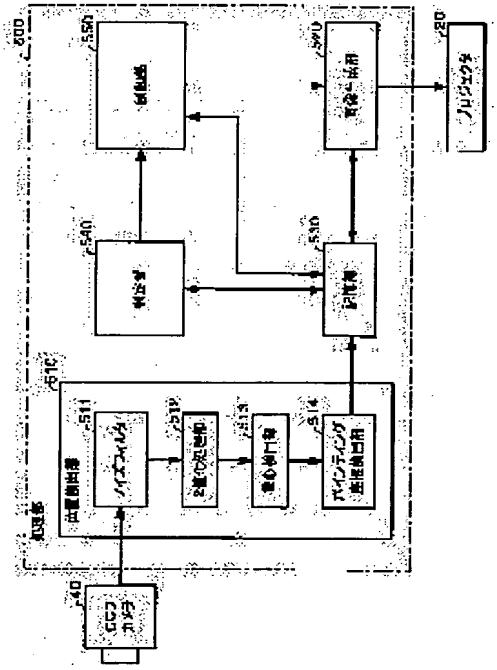
(54) PICTURE GENERATION SYSTEM AND PRESENTATION SYSTEM AND INFORMATION STORAGE MEDIUM



(57)Abstract:

PROBLEM TO BE SOLVED: To provide a picture generation system, a presentation system, and an information storage medium capable of visually understandable showing an instructed operation without using any special instructing tool.

SOLUTION: This picture generation system is provided with a center of gravity detecting part 513 for detecting the center of gravity position of a spot light from a laser pointer based on image pickup information from a CCD camera 40, a pointing coordinate detecting part 514 for detecting pointing coordinates based on the center of gravity position, a storage part 530 for storing the coordinate position of the spot light at the time of turning off the spot light, and a deciding part 540 for deciding whether or not the coordinate position of the spot light at the time of turning off the spot light and the coordinate position of the spot light at the time of re-turning on the spot light are present in a prescribed allowable range. When it is decided that the coordinate position is present in the allowable range by the deciding part 540, it is discriminated that a series of operations such as click operations are performed, and a picture corresponding to the click operations or the like is generated by using a picture generating part 520.

CLAIMS

[Claim(s)]

[Claim 1] In the image generative system which generates the image displayed on the predetermined image display field to which it is projected on the light for directions by the optical pointer An image pick-up means to picturize said image display field, and a directions location detection means to detect the directions location by said optical pointer based on the

image pick-up information by the image pick-up means concerned, A distinction means to detect flashing of said light based on said image pick-up information, and to distinguish the contents of directions, The image generative system characterized by including the control means which controls an image generation means so that the image corresponding to the contents of directions which are the images displayed on said image display field, and were distinguished by the directions location based on the location detection information on said directions location detection means and said distinction means is displayed.
[Claim 2] It is the image generative system characterized by controlling said image generation means so that said distinction means distinguishes click actuation in claim 1 based on flashing of said light and the icon image to which said control means changed either [at least] the color of said icon image or the configuration when said click actuation was performed by the viewing area of a predetermined icon image in said image display field is displayed .
[Claim 3] It is the image generative system which sets to either of claims 1 and 2, and is characterized by distinguishing said distinction means as a series of directions actuation if the difference of the directions location at the time of putting out lights of said light and the directions location at the time of re-lighting of said light is predetermined within the limits.
[Claim 4] The actuation direction of the flashing switch concerned is an image generative system characterized by enlarging relatively about the actuation direction of the flashing switch of said optical pointer compared with the direction where said distinction means differ the range of said difference in claim 3.
[Claim 5] It is the image generative system characterized by controlling said image generation means so that the cursor for directions is displayed near [based on the location detection information on said directions location detection means in said control means] a directions location in either of claims 1-4.
[Claim 6] When the directions location where said cursor for directions which directs the directions location in said image display field out of said image display field is displayed is directed to said control means by said optical pointer in claim 5, The image generative system characterized by controlling said image generation means so that said cursor for directions may be displayed in said image display field and the image which adjusted the display position and the display direction of said cursor for directions is displayed.
[Claim 7] The presentation system characterized by including an image generative system according to claim 1 to 6 and a projection means to project the image for presentations generated with said image generation means towards said image display field.
[Claim 8] It is the information storage medium which memorized the information for generating the image displayed on the predetermined image display field to which it is projected on the light for directions by the optical pointer and in which computer reading is possible. Said information A directions location detection means to detect the directions location by said optical pointer based on the image pick-up information on said image display field, A distinction means to detect flashing of said light based on said image pick-up information, and to distinguish the contents of directions, The control means which controls an image generation means so that the image corresponding to the contents of directions which are the images displayed on said image display field, and were distinguished by the directions location based on the location detection information on said directions location detection means and said distinction means is displayed, The information storage medium characterized by including the information for realizing.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the image generative system, presentation system, and information storage medium which generate the image with which the directions which used the light for directions are performed.
[0002]
[A background technique and Object of the Invention] There was only a function to only direct the image on a screen in optical pointers, such as a common laser pointer used by the presentation system using a liquid crystal projector etc., and the usual PC actuation and the

click function of a mouse had it to them.
[0003] Therefore, the directions person needed to move directions with a laser pointer to the location which once has a stop, a keyboard, and a mouse for keyboard grabbing of PC (Personal Computer), or mouse actuation, after directing the desired location with the laser pointer. For this reason, the flow of directions stopped, the audience could concentrate a directions person's talk, and could not hear it and a directions person was not able to do smooth directions further, either.
[0004] Moreover, in order to solve this problem, two or more carbon buttons are prepared in an optical pointer, and the optical pointer which assigned functions, such as drawing an underline on each carbon button, is proposed.
[0005] For example, when the function which draws an underline was assigned to one of the carbon buttons of a laser pointer and a presenter pushed the carbon button concerned, actuation which draws an underline to the alphabetic character currently displayed as some presentation images was performed.
[0006] However, it was in the condition which becomes heavy and cannot be said to be very comfortable [the operability or the portability at the time of directions actuation] when two or more carbon buttons are prepared in a laser pointer and the laser pointer itself becomes large.
[0007] Moreover, even when the click directions of the icon on a presentation image were carried out by mouse actuation etc. for example, change of a display of an icon image was conventionally scarce. For this reason, it was incomprehensible in whether it is a click also not only for an audience but for a directions person, and whether it is a drag.
[0008] This invention is made in view of the above-mentioned technical problem, and the purpose is in the directions actuation by the optical pointer offering an intelligible image generative system, a presentation system, and an information storage medium visually, without using a special optical pointer.
[0009]
[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the image generative system concerning this invention In the image generative system which generates the image displayed on the predetermined image display field to which it is projected on the light for directions by the optical pointer An image pick-up means to picturize said image display field, and a directions location detection means to detect the directions location by said optical pointer based on the image pick-up information by the image pick-up means concerned, A distinction means to detect flashing of said light based on said image pick-up information, and to distinguish the contents of directions, It is the image displayed on said image display field, and is characterized by including the control means which controls an image generation means so that the image corresponding to the contents of directions distinguished by the directions location based on the location detection information on said directions location detection means and said distinction means is displayed.
[0010] Moreover, the information storage medium concerning this invention is an information storage medium which memorized the information for generating the image displayed on the predetermined image display field to which it is projected on the light for directions by the optical pointer and in which computer reading is possible. A directions location detection means by which said information detects the directions location by said optical pointer based on the image pick-up information on said image display field, A distinction means to detect flashing of said light based on said image pick-up information, and to distinguish the contents of directions, The control means which controls an image generation means so that the image corresponding to the contents of directions which are the images displayed on said image display field, and were distinguished by the directions location based on the location detection information on said directions location detection means and said distinction means is displayed, It is characterized by including the information (for example, program etc.) for realizing.
[0011] Moreover, the program concerning this invention is characterized by including the module for realizing each above-mentioned means.
[0012] According to this invention, without using a special optical pointer, flashing of the light from an optical pointer can be detected, the contents of directions can be distinguished, and the image corresponding to the distinguished contents of directions can be generated.
[0013] Thereby, the image which reflected the contents of directions only using the optical pointer can be displayed, without using a keyboard, a mouse, etc.

[0014] A directions person can direct the image corresponding to the contents of directions, without having an optical pointer, a keyboard, a mouse, etc. again. Therefore, a directions person can tell an audience his contents of actuation efficiently, and it is easier for an audience to understand the contents of directions.
[0015] Here, as an image corresponding to said contents of directions, the image which changed the icon into the selection condition, the image to which an icon is moved, the image at the time of activation of the application program related with the icon, etc. correspond, for example. That is, the image corresponding to said contents of directions may be a static image, or may be a dynamic image.
[0016] Moreover, in said image generative system, said information storage medium, and said program, said distinction means distinguishes click actuation based on flashing of said light, and when said click actuation is perform by the viewing area of the predetermined icon image in said image display field, it is desirable [said control means] to control said image generation means so that the icon image to which either [at least] the color of said icon image or the configuration was changed is display.
[0017] As for a directions person, according to this, it turns out visually that click actuation was distinguished.
[0018] Moreover, it is easily discriminable that the operator of an optical pointer is performing click actuation by this for those who are looking at the image concerned.
[0019] In said image generative system, said information storage medium, and said program moreover, said distinction means Based on flashing and migration of said light, drag actuation is distinguished and it sets to said image generative system, said information storage medium, and said program. Said control means When said drag actuation is performed by the viewing area of the predetermined icon image in said image display field, It is desirable to control an image generation means so that it is displayed that the icon image to which either [at least] the color of said icon image or the configuration was changed is generated, and the icon image concerned is moved based on migration of said light.
[0020] As for a directions person, according to this, it turns out visually that drag actuation was distinguished.
[0021] Moreover, it is easily discriminable that the operator of an optical pointer is performing drag actuation for those who are looking at the image concerned.
[0022] Moreover, it sets to said image generative system, said information storage medium, and said program, and if the difference of the directions location at the time of putting out lights of said light and the directions location at the time of re-lighting of said light is predetermined within the limits, it is desirable [said distinction means] to distinguish as a series of directions actuation.
[0023] According to this, by preparing predetermined tolerance, when directing by blinking light, even when there is some blurring, it can distinguish as directions actuation appropriately.
[0024] Moreover, as for said distinction means, in said image generative system, said information storage medium, and said program, it is desirable to enlarge the range of said difference relatively about the actuation direction of the flashing switch of said optical pointer compared with a different direction from the actuation direction of the flashing switch concerned.
[0025] According to this, incorrect detection can be reduced by setting up the tolerance which widened the direction where blurring tends to occur. Therefore, directions actuation can be distinguished more appropriately.
[0026] For example, when performing flashing actuation of light by pushing down a flashing switch, light tends to blur downward. Therefore, in consideration of blurring of the light concerned, suitable tolerance can be set up by extending tolerance downward.
[0027] Moreover, as for said control means, in said image generative system, said information storage medium, and said program, it is desirable to control said image generation means so that the cursor for directions is displayed near [based on the location detection information on said directions location detection means] a directions location.
[0028] In said image generative system, said information storage medium, and said program moreover, said control means When the directions location where said cursor for directions which directs the directions location in said image display field is displayed outside said image display field is directed by said optical pointer, so that said cursor for directions may be displayed in said

image display field It is desirable to control said image generation means so that the image which adjusted the display position and the display direction of said cursor for directions is displayed.
[0029] According to this, even when the cursor for directions of a leftward arrow-head configuration has protruded only a few from the left end of an image display field outside an image display field, a directions location can be appropriately directed by changing the cursor for directions into the display of a rightward arrow-head configuration, for example.
[0030] Moreover, the presentation system concerning this invention is characterized by including a projection means to project the above-mentioned image generative system and the image for presentations generated with said image generation means towards said image display field.
[0031] According to this invention, in a presentation, directions actuation can realize an intelligible presentation system visually, without using a special optical pointer.
[0032]
[Embodiment of the Invention] The case where this invention is hereafter applied to the presentation system which directs using an optical pointer is taken for an example, and it explains, referring to a drawing.
[0033] (System-wide explanation) Drawing 1 is the approximate account Fig. of the presentation system concerning an example of the gestalt of this operation.
[0034] The image for predetermined presentations is projected from the projector 20 of a screen mostly prepared in the transverse plane. A presenter 30 performs the presentation to a third person, pointing to the location of a request of the image of the field 12, i.e., an image display field, where the image on a screen 10 is displayed with the laser pointer 100.
[0035] If a presenter 30 directs the location of a request of the image display field 12 on a screen using the spot light 200 on which it is projected from the laser pointer 100, it will be mostly prepared in a transverse plane and part and spot light 200 of the image display field 12 and a presenter 30 will be picturized as a directions image by CCD camera 40 of the image display field 12 which functions as an image pick-up means.
[0036] Image processings, such as center-of-gravity detection processing, are performed, and, as for a directions image, the center-of-gravity location of the spot light 200 is detected as a directions location.
[0037] Thus, when projecting a presentation image and directing the icon on a presentation image with the laser pointer 100, for an audience, it is incomprehensible in whether it is a click and whether by the usual technique, since change of an icon image is scarce, it is a drag.
[0038] Moreover, when realizing functions, such as drawing an underline, using the laser pointer 100 into a desired part among presentation images and laser pointer 100 the very thing will become large if two or more carbon buttons are prepared in the laser pointer 100, it will become heavy and the operability and the portability at the time of directions actuation will be in the condition that it cannot be said that it is very comfortable.
[0039] Then, it enables it to perform intelligible directions actuation visually with the gestalt of this operation using the usual laser pointer 100, without using a keyboard, a mouse, or a highly efficient laser pointer.
[0040] Drawing 2 (B) shows the condition that the spot light 200 lapped with the icon 300, drawing 2 is drawing showing the condition of the spot light 200 in the image display field 12, and an icon 300, and drawing 2 (D) is [drawing 2 (A) shows the condition at the time of spot light 200 migration, and / drawing 2 (C) shows the condition that the spot light 200 disappeared, and] drawing showing the condition that the spot light 200 re-lit up.
[0041] Here, a presenter assumes performing click directions of an icon 300 by flashing actuation of the laser pointer 100.
[0042] As shown in drawing 2 (A), when a presenter moves the tip of the laser pointer 100 leftward, the spot light 200 also moves leftward toward an icon 300.
[0043] As shown in drawing 2 (B), a presenter 30 moves the tip of the laser pointer 100 leftward to the point where the spot light 200 laps with an icon 300.
[0044] And when the spot light 200 laps with an icon 300, as shown in drawing 2 (C), a presenter 30 turns OFF the flashing switch of the laser pointer 100, and extinguishes the spot light 200.
[0045] Immediately after turning OFF a switch, a presenter 30 turns ON the flashing switch of the laser pointer 100, and makes the spot light 200 re-turn on, as shown in drawing 2 (D).
[0046] By identifying the above flashing actuation, a processor can be recognized for the

presenter having performed click actuation by flashing actuation.
[0047] By recognizing click actuation, a processor changes the color of an icon 300, as shown in drawing 2 (D).
[0048] Thereby, an audience can distinguish easily that the presenter is performing click actuation.
[0049] Next, the relation between the spot light 200 and each function, such as click actuation, is explained more to a detail.
[0050] Drawing 3 is the mimetic diagram showing the relation between the luminescence condition of the spot light 200, and a function.
[0051] A luminescence condition shows the condition of the switch OFF of a lower line in the condition of the switch ON of the upper line.
[0052] For example, in an initial state, a switch is OFF and is in the condition of un-directing. If a switch is turned on, a directions function as shown in drawing 2 (A) will work.
[0053] And when it is set to OFF (disappearance) from the condition of ON of a switch within predetermined time and is further set to ON (re-lighting), the function as a single click works.
[0054] Then, in the state of Switch ON, a directions function works again.
[0055] And it is set to OFF (disappearance) and ON (re-lighting) from the condition of ON of a switch within predetermined time, and further, when set to OFF (re-disappearance) and ON (re-lighting), the function as a double click works.
[0056] Then, in the state of Switch ON, a directions function works again, and it is un-directing in the state of Switch OFF.
[0057] Thus, various functions are realizable when at least flashing actuation of the spot light 200 detects the count of flashing and flashing spacing.
[0058] Moreover, with the gestalt of this operation, in the case of flashing actuation of the spot light 200, as shown in drawing 2 (D), tolerance 320 is formed to the gap of the location at the time of disappearance of the spot light 200 and re-lighting. That is, if the difference of the directions location by the spot light 200 at the time of re-lighting and the directions location at the time of disappearance is settled in tolerance 320, even if directions locations differ somewhat, it will recognize as a series of directions actuation.
[0059] Especially about the tolerance 320, as shown in drawing 2 (D), the vertical direction is set up width to the longitudinal direction. This is because the switch of the laser pointer 100 is formed so that it may be pushed in the vertical direction, and the amount of blurring of the vertical direction is considered to be large compared with the amount of blurring of a longitudinal direction at the time of actuation of a switch. Furthermore, lower tolerance may be set up among the vertical directions more greatly than the bottom.
[0060] In addition, when the switch of the laser pointer 100 is formed so that it may be pushed on a longitudinal direction, it is desirable to set up a longitudinal direction width for tolerance 320 to the vertical direction.
[0061] Thus, by forming tolerance 320, even when there is some blurring, it can distinguish as directions actuation appropriately.
[0062] Moreover, directions actuation can be more appropriately distinguished by setting up the tolerance 320 which widened the direction where blurring tends to occur.
[0063] In addition, with the gestalt of this operation, it is taking into consideration also about the relation between the such amount of blurring of gaps, i.e., the amount of the spot light 200, and the projector distance of laser light.
[0064] Drawing 4 is the mimetic diagram showing the relation between the projector distance of laser light, and the amount of gaps of the spot light 200.
[0065] Even if the blurring include angle is fixed as theta, the amount of gaps of the spot light 200 becomes large with L1, L2, and L3, as the distance from the laser pointer 100 to the image display field 12 becomes long with D1, D2, and D3.
[0066] Therefore, when the distance from the laser pointer 100 to the image display field 12 becomes long, it is desirable to also set up tolerance 320 more greatly.
[0067] (Explanation about functional block) Next, functional block of this system for realizing these functions is explained.
[0068] Drawing 5 is the functional block diagram of the system concerning an example of the gestalt of this operation.
[0069] This system is constituted including CCD camera 40 which is an image pick-up means,

the processing section 500, and the projector 20 (liquid crystal projector of a front projection mold) which is a projection means.
[0070] Moreover, the processing section 500 is constituted including the location detecting element 510 which detects a directions location based on the image pick-up signal of CCD camera 40, and the image generation section 520 which generates the image information for displaying on the image of cursor 200, the image of an icon 300, and the image display field 12 etc. based on the detection result of a directions location, and is outputted to a projector 20.
[0071] A location detecting element 510 is more specifically constituted including the noise filter 511 from which the noise of an image pick-up image removes, the binary-ized processing section 512 which perform binary-ization so that it may be easy to perform data processing to image pick-up information, the center-of-gravity detecting element 513 which detect the center of gravity of the spot light 200 based on the image pick-up information made binary, and the pointing coordinate detecting element 514 which detect a directions location (a pointing location) based on the detected center-of-gravity location.
[0072] Moreover, the processing section 500 is constituted including the directions location at the time of disappearance of the spot light 200 mentioned above, tolerance 320, the storage section 530 that memorizes an application program etc. further, whether the directions location at the time of re-lighting is in tolerance 320 and the judgment section 540 to judge, and the control section 550 which controls the image generation section 520 based on this judgment result.
[0073] In addition, about the hardware configuration of the processing section 500, it mentions later.
[0074] Next, it explains using a flow chart that detection of directions actuation flows using each part mentioned above.
[0075] (Explanation about detection of directions actuation flowing) Drawing 6 is a flow chart which shows the flow of detection of the directions actuation concerning an example of the gestalt of this operation.
[0076] Here, click actuation is mainly explained.
[0077] A presenter 30 turns on the laser pointer 100 and directs the image display field 12 (step S4).
[0078] The location detecting element 510 detects the spot light 200 using the image pick-up information from CCD camera 40, and detects a directions coordinate by the pointing coordinate detecting element 514.
[0079] When the spot light 200 laps with an icon 300, a presenter 30 switches off the laser pointer 100, in order to perform click actuation, as shown in drawing 2 (A) - drawing 2 (C) (step S6).
[0080] At this time, the pointing coordinate detecting element 514 memorizes the directions coordinate A in front of putting out lights, and the putting-out-lights time of day A in the storage section 530 (step S8).
[0081] And the judgment section 540 is generated in the image generation section 520, and judges whether based on the image information memorized by the storage section 530, the icon 300 which has the coordinate which is in agreement with Coordinate A is displayed on the current screen (step S10).
[0082] And as shown in drawing 2 (D), in order that a presenter 30 may perform click actuation, the laser pointer 100 is re-turned on (step S12).
[0083] The pointing coordinate detecting element 514 detects the directions coordinate B and time of day B at the time of re-lighting, and memorizes them in the storage section 530 (step S14).
[0084] The judgment section 540 judges whether the coordinate location A at the time of putting out lights memorized by the storage section 530 is compared with the coordinate location B at the time of re-lighting, and it is in tolerance 320. Furthermore, the judgment section 540 judges whether the time of day A at the time of putting out lights memorized by the storage section 530 was compared with the time of day B at the time of re-lighting, and re-lighting was performed in the 1st predetermined time (step S16).
[0085] It is recognized as it being in tolerance 320, and the judgment section 518 being the 1st click actuation, when re-lighting is performed in predetermined time amount (step S18).
[0086] When it has been recognized as the judgment section 518 being the 1st click actuation, an instruction is given to a control section 550 so that the image of the icon 300 which is in

agreement with the coordinate location A grasped at step S10 may be changed.
[0087] A control section 550 controls the image generation section 520 based on the instruction concerned to change the image of an icon 300.
[0088] By the control concerned, the image generation section 520 generates image information so that the image with which the icon 300 as shown in drawing 2 (D) was chosen may be displayed, and it outputs the image information concerned to a projector 20.
[0089] A projector 20 projects an image based on the image information concerned. It means that the image with which the icon 300 as shown in drawing 2 (D) was chosen by this is displayed, and the single click was performed (step S20).
[0090] Furthermore, it judges whether the judgment section 540 has putting out lights and lighting into the 2nd [after time of day B] predetermined time (step S22).
[0091] Moreover, the judgment section 540 memorizes the counted value which shows whether there were how many times putting out lights and lighting, respectively in the storage section 530, when putting out lights and lighting are in the 2nd [after time of day B] predetermined time (step S24).
[0092] And when counted value turns into a predetermined value, or when it goes through the 2nd predetermined time, the judgment section 540 gives an instruction to a control section 550 so that processing (a double click, drag) may be performed according to counted value.
[0093] Based on the instruction concerned, a control section 550 controls the image generation section 520 so that processing according to the contents of directions is performed.
[0094] For example, when the image generation section 520 judges whether the predetermined application program is related with the icon 300 with reference to the storage section 300 in a double click and the related attachment concerned is carried out, the image information for displaying the image at the time of application program activation is generated (step S26).
[0095] And a projector 20 projects the image at the time of application program activation on a screen 10 like the flow of the processing mentioned above.
[0096] Thereby, the display screen on a screen 10 is changed and a presenter 30 and an audience can recognize visually that double-clicked the icon 300 and the application program was performed (step S28).
[0097] As mentioned above, according to the gestalt of this operation, click actuation etc. can be performed using the common laser pointer 100, without using a mouse, a keyboard, etc. Moreover, by changing the image of an icon 300 in the cases, such as click actuation, for a presenter 30 and an audience, it is visually intelligible and a presentation can be performed effectively.
[0098] Moreover, with the gestalt of this operation, the judgment section 540 judges whether based on the count of flashing of the spot light 200 detected by the pointing coordinate detecting element 514, the presenter 30 performed actuation for display which image among a click image (image which changed the icon into the selection condition), a drag image (image to which an icon is move), the image at the time of a double click (image at the time of activation of the application program related with the icon), etc.
[0099] For example, processing becomes heavy although it is also possible to detect change of a motion of the spot light 200 and to grasp a presenter's 30 contents of actuation. By judging by the count of flashing of the spot light 200, the location detecting element 510 and judgment section 518 grade can be realized with a simple configuration, and it can judge quickly.
[0100] (Example using cursor) It is also possible to change the display of the cursor it not only changes the display of an icon 300, but displayed in addition on the detected directions location by following. Here, it assumes displaying the cursor of an arrow-head configuration at the time of directions, displaying the cursor of a circle configuration at the time of a click, and displaying elliptical cursor at the time of a drag.
[0101] Drawing 7 (B) shows the condition that cursor lapped with the icon, drawing 7 is drawing showing the condition of the cursor in an image display field, and an icon, and drawing 7 (D) is [drawing 7 (A) shows the condition at the time of a cursor advance, and / drawing 7 (C) shows the display condition of the cursor at the time of click recognition, and] drawing showing the display condition of the cursor at the time of drag recognition.
[0102] As shown in drawing 7 (A), a presenter 30 moves the tip of an optical pointer leftward, and brings the cursor 202 of a leftward arrow-head configuration close to an icon 300.
[0103] And as shown in drawing 7 (B), when a presenter 30 overlaps the tip of the arrow head of

cursor 202 with an icon 300, he once puts out the light, and is re-turned on immediately. Thereby, it is recognized as the judgment section 518 being click actuation, and an instruction is issued so that it may become the configuration of the cursor which suited click actuation at the image generation section 520.

[0104] By issuing such an instruction, as shown in drawing 7 (C), the image generation section 520 generates the image of the cursor 204 of a circle configuration, and a projector 20 indicates the image of the cursor 204 of a circle configuration by projection.

[0105] Moreover, at the time of drag actuation, after a presenter 30 turns ON the switch of an about [5 second] light pointer and turns OFF, he performs drag actuation by turning ON immediately and moving the tip of an optical pointer.

[0106] The judgment section 518 which has recognized that such actuation was performed issues an instruction so that it may become the configuration of the cursor which suited drag actuation at the image generation section 520.

[0107] By issuing such an instruction, as shown in drawing 7 (D), the image generation section 520 generates the image of the elliptical cursor 206, and a projector 20 indicates the image of the elliptical cursor 206 by projection. In addition, at the time of drag actuation, a projector 20 indicates by projection so that an icon 300 and cursor 206 may be moved to compensate for migration of the light from an optical pointer.

[0108] Thus, a presenter 30 can perform intelligible directions actuation visually for an audience not only the icon 300 but by changing the display of cursor 202-206.

[0109] Furthermore, with the gestalt of this operation, cursor 202 is displayed that the cursor 202 for directions can tend to be seen also in the endpoint of the image display field 12.

[0110] Drawing 8 is other drawings showing the condition of the cursor 202 in the image display field 12, and an icon 300. Drawing 8 (A) The condition of directing the icon 300 near the center of an image display field with cursor 202 is shown. Drawing 8 (B) The condition of directing the icon 300 near a right end with the conventional cursor 202 is shown, and drawing 8 (B) is drawing showing the condition of directing the icon 300 near a right end with the cursor 202 of this operation gestalt.

[0111] For example, as shown in drawing 8 (A), when an icon 300 is near the center of an image display field in the usual condition, it is possible to direct with the cursor 202 of a leftward arrow-head configuration.

[0112] However, to an icon 300, as shown in drawing 8 (B), even if it is going to direct the icon 300 near a right end with the cursor 202 of a leftward arrow-head configuration, since the location of cursor 202 is right-hand side, cursor 202 will protrude it from the image display field 12. For this reason, in fact, in spite of being able to direct, cursor 202 is no longer displayed.

[0113] With the gestalt of this operation, as shown in drawing 8 (C), when directing the icon 300 near a right end with the cursor 202 of a leftward arrow-head configuration, such a problem is solved by making the sense of cursor 202 reverse and displaying cursor 202 on the left-hand side of an icon 300.

[0114] For example, by adjusting the sense and location of cursor 202, if the range of the flash is in predetermined tolerance when the judgment section 518 distinguishes that the display position of cursor 202 overflows the image display field 12 based on the detection result of the pointing coordinate detecting element 514, the image generation section 520 will be controlled so that cursor 202 is displayed in the image display field 12.

[0115] Thus, according to the gestalt of this operation, even when cursor 202 overflows outside the image display field 12, cursor 202 can be displayed appropriately.

[0116] (Explanation about a hardware configuration) Next, the hardware configuration of the processing section 500 is explained.

[0117] Drawing 9 is the explanatory view of the hardware configuration of the processing section 500 concerning an example of the gestalt of this operation.

[0118] With the equipment shown in this drawing, the image generation IC 1010 and I/O (input/output port) 1020-1 which realize the function of CPU1000 and ROM1002 which realize the function of the location detecting element 510, the judgment section 540, and a control section 550, RAM1004 which realizes the function of the storage section 530, the information storage medium 1006, and the image generation section 520, and 1020-2 are mutually connected by the system bus 1016 possible [data transmission and reception]. And it connects with the device of CCD camera 40 and projector 20 grade through I/O 1020-1 and 1020-2.

[0119] As for the information storage medium 1006, a program, a module, etc. are stored. In addition, as an information storage medium 1006, hard disks which make information read with the MAG, such as CD-ROM, DVD-ROM, etc. which make information read by laser light, memory, etc. are applicable, for example. Moreover, a contact method or a non-contact method is sufficient as the reading method of the information from an information storage medium.
[0120] Moreover, various kinds of processings in which it explained by drawing 1 - drawing 8 are realized by the information storage 1006 which stored the program for performing these processings, and CPU1000 and the image generation IC1010 grade which are operated according to the program concerned. In addition, CPU1000, general-purpose DSP, etc. may perform by software processing performed in image generation IC1010 grade.
[0121] Moreover, it is also possible to realize each function mentioned above by downloading the program for replacing with the information storage medium 1006 and realizing each function mentioned above etc. from host equipment etc. through a transmission line. That is, the information for realizing each function mentioned above may be embodied by the subcarrier (embodied).
[0122] As mentioned above, although the gestalt of the suitable operation which applied this invention has been explained, application of this invention is not limited to the example mentioned above.
[0123] (Other examples) For example, as modification of an icon 300 and a display of cursor 202 grade, you may be modification of only a configuration, modification of only a color, and modification of both a configuration and a color. Specifically, a flashing display, inverse video, etc. may be performed. These can also show the directions actuation by the operator of an optical pointer intelligibly visually. In addition, an optical pointer is not restricted to the laser pointer mentioned above, but can apply the pointer which projects various kinds of light, such as an infrared pointer.
[0124] Moreover, it is also possible to perform processing which judges the contents of directions and sounds a sound with the gestalt of this operation, for example although the example which judges the contents of directions and generates an image was explained in which the part which has judged the contents of directions is vibrated.
[0125] Moreover, this invention can be applied, also when a display means performs image display and it performs a presentation etc. besides a projection means like a projector mentioned above. As such a display means, display units, such as CRT (CathodeRay Tube), PDP (Plasma Display Panel), FED (Field Emission Display) and EL (Electro Luminescence) besides a liquid crystal projector, and a direct viewing type liquid crystal display, etc. correspond, for example.
[0126] Moreover, each part of the processing section 500 may be built in a projector 20, may be built in the external device of the projectors 20, such as PC, and may be shared and built in with a projector 20, PC, etc.
[0127] Furthermore, although the example mentioned above explained the example which applied the projector of a front projection mold, it is also possible to apply the projector of a tooth-back projection mold.
[0128] Moreover, this invention is not limited to a presentation system, but can be applied also to various kinds of image generative systems which detect a directions location and generate an image based on a detection result.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the approximate account Fig. of the presentation system concerning an example of the gestalt of this operation.
[Drawing 2] Drawing 2 (B) shows the condition that spot light lapped with the icon, it is drawing showing the condition of the spot light in an image display field, and an icon, and drawing 2 (D) is [drawing 2 (A) shows the condition at the time of spot light migration, and / drawing 2 (C) shows the condition that spot light disappeared, and] drawing showing the condition that spot light re-lit up.
[Drawing 3] It is the mimetic diagram showing the relation between the luminescence condition of spot light, and a function.

[Drawing 4] It is the mimetic diagram showing the relation between the projector distance of laser light, and the amount of gaps of spot light.
[Drawing 5] It is the functional block diagram of the system concerning an example of the gestalt of this operation.
[Drawing 6] It is the flow chart which shows the flow of detection of the directions actuation concerning an example of the gestalt of this operation.
[Drawing 7] Drawing 7 (B) shows the condition that cursor lapped with the icon, it is drawing showing the condition of the cursor in an image display field, and an icon, and drawing 7 (D) is [drawing 7 (A) shows the condition at the time of a cursor advance, and / drawing 7 (C) shows the display condition of the cursor at the time of click recognition, and] drawing showing the display condition of the cursor at the time of drag recognition.
[Drawing 8] It is drawing showing the condition that are other drawings showing the condition of the cursor in an image display field, and an icon, and drawing 8 (A) shows the condition of directing the icon near the center of an image display field with cursor, drawing 8 (B) shows the condition are directing the icon near a right end with the conventional cursor, and drawing 8 (C) is directing the icon near a right end with the cursor of this operation gestalt.
[Drawing 9] It is the explanatory view of the hardware configuration of the processing section concerning an example of the gestalt of this operation.
[Description of Notations]
12 Image Display Field
20 Projector
30 Presenter
40 CCD Camera
100 Laser Pointer
510 Location Detecting Element
520 Image Generation Section
540 Judgment Section
550 Control Section
1006 Information Storage Medium